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**MANUAL**

OF

**SURGICAL OPERATIONS;**

CONTAINING

THE NEW METHODS OF OPERATING

*DEvised BY LISFRANC;*

FOLLOWED BY

*Two Synoptic Tables of Natural and Instrumental  
Labours.*

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BY J. COSTER, M. D. & P.

OF THE UNIVERSITY OF TURIN.

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THE TRANSLATION AND NOTES

BY JOHN D. GODMAN, M. D.

LECTURER ON ANATOMY AND PHYSIOLOGY.

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PHILADELPHIA:

H. C. CAREY & I. LEA.

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EASTERN DISTRICT OF PENNSYLVANIA, to wit:

BE IT REMEMBERED, that on the twenty-first day of November in the forty-ninth year of the independence of the United States of America, A. D. 1825, H. C. CAREY and I. LEA of the said district, have deposited in this office the title of a book, the right whereof they claim as Proprietors, in the words following, to wit :

*"A Manual of Surgical Operations; containing the new methods of operating devised by Lisfranc; followed by two Synoptic Tables of Natural and Instrumental Labours.—By J. Coster, M. D. & P. of the University of Turin. The translation and notes by John D. Godman, M. D. Lecturer on Anatomy and Physiology.*

In conformity to the act of the congress of the United States, intituled " An act for the encouragement of learning, by securing the copies of maps, charts, and books, to the authors and proprietors of such copies, during the times therein mentioned."—And also to the act, entitled, " An act supplementary to an act entitled, " An act for the encouragement of learning, by securing the copies of maps, charts and books, to the authors and proprietors of such copies during the times therein mentioned," and extending the benefits thereof to the arts of designing, engraving, and etching historical and other prints."

D. CALDWELL,

*Clerk of the Eastern District of Pennsylvania.*

**TO WILLIAM GIBSON, M. D.**

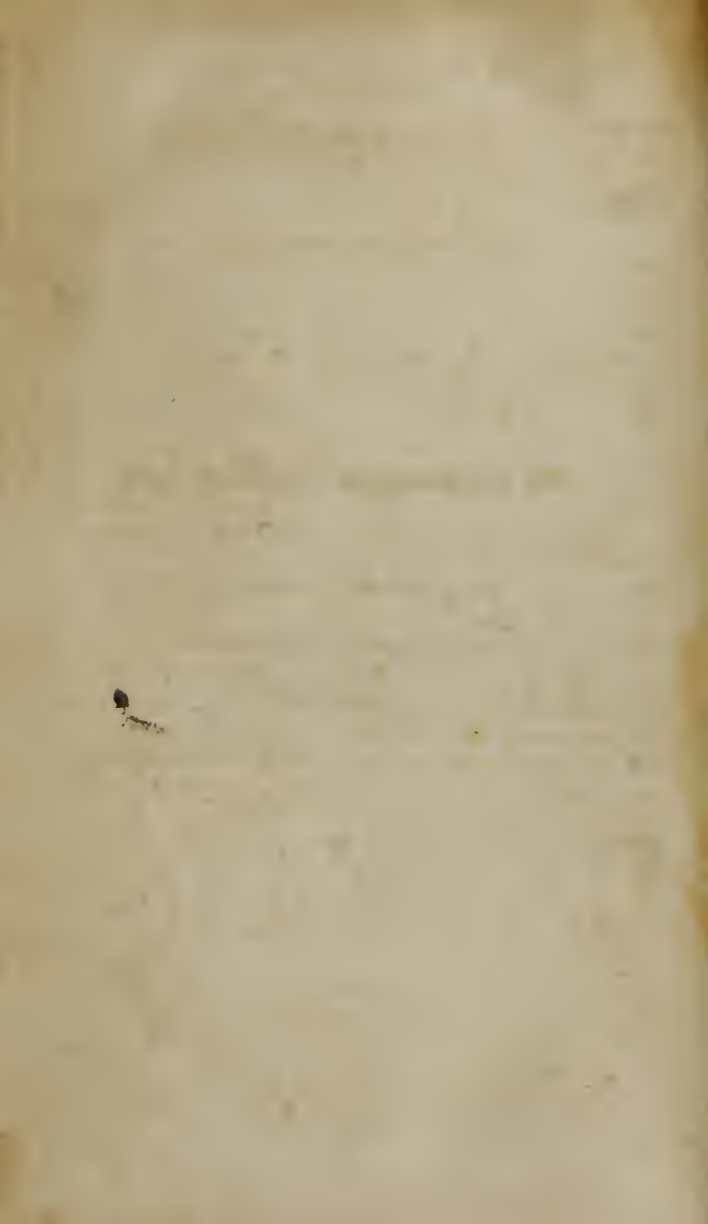
PROFESSOR OF SURGERY IN THE UNIVERSITY OF PENNSYLVANIA,

**THIS MANUAL OF OPERATIONS**

**IS RESPECTFULLY DEDICATED**

**BY HIS FRIEND,**

**THE TRANSLATOR.**



It is not our intention, in publishing this Manual, to enter into the details of affections which demand the operator, nor the instruments which are

## INTRODUCTION.

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If surgery be the most efficacious resource of the healing art, it is only, as Professor Richerand observes, in the hands of such as cultivate it with the diligence it merits, and the information it demands. It is not by the sight, nor by familiarity with rules alone, that an operator who wishes to acquire this knowledge should be guided; it is necessary to add thereto, long continued and active practice. It is not sufficient to have an exact acquaintance with the form, structure, situation, and functions of the different organs constituting the living body; it is not sufficient to have surmounted the disgust, difficulties, and fatigue which must necessarily be endured by such as interrogate the cold remains of mortality, in order to learn how to relieve those who suffer. Doubtless the surgeon should be long accustomed to perform operations on the dead before he attempts them on the living body, because success depends in great measure on his address; and an error committed in this respect is no less disagreeable to him, than dangerous to his patient: but, still this is not the whole of Surgery. How dare one who calls himself a professional man, lay rash hands on the organs of an unfortunate who implores his aid, without having learned to calculate the results of an operation; if he undertake it without considering the constitution of the patient, or the condition of the viscera—in a word, if he has not a profound acquaintance with the principles of Medicine?—The healing art, too long retarded by the ridiculous and dangerous sepa-

been se-  
parated.

If the surgeon be ignorant of every thing but the mechanical part of the science, he cannot appreciate the influence of the great viscera on external parts, neither can he estimate the action of the latter upon the viscera; he cannot, for example, perceive that a great operation may be followed by most disastrous consequences, if performed during the existence of an internal inflammation; he cannot be aware that the irritation caused by the use of instruments may re-act on important viscera, and the irritation of these re-acting equally on the external wound, will more easily inflame it, and the cure, should it ever happen, will be certainly delayed for a very long time.\*

\* The difference between a surgeon and a mere operator, may be more thoroughly appreciated by contrasting them:—the *surgeon* inquires into the causes and removes the consequences of constitutional or local disease—the *operator* inquires into the willingness of his patient to submit, and resorts to the knife. The *surgeon* relies on the restoration of the healthy actions by regimen and medicine—the *operator* relies on himself, and cuts off the diseased part. The *surgeon*, reflecting on the comfort and feelings of his patient, uniformly endeavours to save him from pain and deformity—the *operator* considers his own immediate advantage and the notoriety he may acquire, regardless of all other considerations. The *surgeon* reluctantly decides on the employment of instruments—the *operator* delays no longer than to give his knife a keen edge. The *surgeon* is governed by the principles of medicine—the *operator* most generally by the principle of interest: one is distinguished by the numbers he has saved from mutilation and restored to usefulness—the other by the number of cripples he has successfully made. The *surgeon* is an honour to his profession and a benefactor to his fellow creatures—the

It is not our intention, in publishing this Manual, to enter into the details of affections which demand the aid of the operator, nor the circumstances which authorise or forbid his interference; these are circumstances which we suppose to be known. In adhering constantly to the title of our work, we shall only give in the most succinct manner, the operations which the practitioner ought to know how to perform appropriately.

Convinced of our own insufficiency, we have often drawn from the works of the great masters which have done honour to France. The labours of her Boyer, Dupuytren, Percy, Richerand, Roux, &c. are the guides under whose auspices we have attempted the present task; nor have we ever neglected to profit by the intelligence of the surgeons of other countries, who, though fewer in number than those of France, where surgery appears to have become acclimated, nevertheless show themselves from time to time, like those brilliant stars which speedily disappear, and astonish, for an instant, by the spectacle of their novelty. The names of Scarpa, of Vacca, and of Astley Cooper, are sufficient alone to render a nation illustrious.

The operations contained in this volume are generally described according to the modifications introduced by Mr. LISFRANC. The name of this skilful surgeon is already sufficiently known in Europe, either through the students who come from all quarters to perfect themselves under his eye, or by his unwearied efforts to simplify the operations, or to discover more sure and expeditious methods than those already known; efforts which have already placed Lisfranc in the first rank among French surgeons. Mr. Averill, a young English

*mere operator* renders the profession odious, and is one of the greatest curses to which mankind, among their manifold miseries, are exposed.—J. D. G.

surgeon, one of his former pupils, has published a treatise which contains some of his operations, as practised on the dead body, and from which we have derived all possible advantage.

If we have not introduced in this work all the clearness and order that it may be desirable to find, we do not pretend to cast the blame on the authors of the methods we describe. After having done our best to treat with due brevity and exactness a subject naturally so arid, it only remains for us to ask a little indulgence if we have not attained our end.



## MANUAL OF SURGICAL OPERATIONS.

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### *Of Incisions in General.*

It may possibly be considered as useless to give rules for the performance of the simplest of all surgical operations, yet it is proved that there is little hope of advancing in any science, if principles be not studied with the most serious attention. But, it is not sufficient to know how to perform the first operations according to certain fixed rules, if we do not, at the same time, acquire that ease and dexterity which eminently distinguish the expert from the awkward surgeon. Hence flows the necessity of being well acquainted with the different methods of holding the scalpel or bistoury, in making the incisions we are about to describe. It is only this practice which can give the hand the necessary suppleness and dexterity: moreover, the rules prescribed for holding the bistoury are of the greatest utility for the attainment of this object; and to show that it is not useless to insist on this point, we quote the expressions of a distinguished professor:—"When we are well acquainted with all that is simple, we more easily learn and perfectly execute that which is compound: and, we often find that success in great undertakings very much depends on the perfect performance of small things."

### *Rules for holding the Bistoury.*

We may divide the different modes of holding the bistoury into five principal positions, which are here de-

scribed, in order to avoid repetition, when we treat of operations requiring the use of this instrument.

*First position.*—The bistoury is held like a pen. The edge is turned towards the palm, and the point towards its ulnar edge; the thumb and fore finger are placed on the junction of the blade and handle, and the middle finger on the flat part of the blade, at a greater or less distance from the point, to limit the depth of the incision: the ring and little fingers serve for a point of support, as in writing.

*Second position.*—This is entirely similar to the first, except the edge is turned from the palm of the hand.

*Third position.*—The edge of the bistoury is turned from the palm of the hand: the thumb and middle finger are placed on the junction of the blade and handle, and the fore finger on the flat of the blade; the ring and middle finger remain closed on the handle, in order to confine it upon the ulnar edge of the palm.

*Fourth position.*—Entirely similar to the third, except that the edge is turned towards the palm.

*Fifth position.*—The bistoury is held like a violin bow; the thumb and middle finger are fixed on the junction of the blade and handle; the fore finger on the flat of the blade; the ring finger on the side of the handle, and the little finger remains free, and is raised up.

#### *Simple puncture for opening an abscess.*

When a purulent collection is quite superficially seated, a simple aperture made with a lancet generally suffices for the evacuation of the matter; but, if it be deep seated, it is necessary to employ a straight bistoury, which is used in the following manner:—

Holding the bistoury in the first position, it is plunged slowly and perpendicularly into the abscess, until the want of resistance warns us that the point has entered the purulent cavity. The middle finger placed on

the flat of the blade serves to determine the depth to which it may be introduced. This simple puncture is often alone sufficient, and should be principally employed in parts exposed to view, in order to avoid the deformity of too large a cicatrix. But, should the pus be too thick, it will not escape through such an opening;—in this case we perform the following operation:—

*Puncture and straight incision.*

With the thumb and finger of the left hand draw the skin tight; (this is a general rule; the skin should always be tightened from the side opposite to the course of the incision.) Holding the bistoury in the third position, plunge the blade perpendicularly through the integuments; and when it has been introduced to a sufficient depth, lower the instrument, until it forms with the plane of the incision an angle of  $45^{\circ}$ ; and continue to cut in this manner from left to right. Having extended the incision to the point desired, raise the instrument and terminate the incision by bringing it again to the perpendicular, in order that it may be of an equal depth from one extremity to the other, and avoid making in the skin the glancing incision known by the name of *queue*.\*

It is necessary in making this incision not to thrust the blade too deeply, for fear of injuring important parts in the vicinity. It is well to know, also, that if the integuments be not properly stretched, they roll before the instrument, and cause the patient unnecessary pain.

\* We have no English technical for this cut; it is a partial division of the integuments, unnecessarily prolonged beyond the limits of the proper incision, either by beginning with the knife held too horizontally, or withdrawing it in the same manner; thus, bringing the edge into contact with the surface, beyond the point where the skin is to be entirely cut through.

J. D. G.

These precautions are equally applicable to all incisions made over the course of arteries, to the operation for hernia, the removal of subcutaneous tumours, &c.

### *Crucial incision.*

This is formed by two straight incisions, the first of which goes from left to right, as has been above described; the second is divided into two parts, each of which cuts the first at right angles. To perform this second incision in two opposite directions, holding the bistoury in the third position, and stretching the integuments opposite the side from the operator, makes a first cut which terminates perpendicularly in that which was first made: then, changing the position of the bistoury, and stretching the integuments towards himself with the ulnar edge of the left hand, he makes a strong movement of pronation and rotation, with his right hand, to commence the other section, which he completes at the same point where the first ended, by bringing the instrument, (which forms an angle of from  $45$  to  $50^{\circ}$ ,) to the perpendicular.

The crucial incision may also be made in the following manner:—

After having made the first incision, as usual, from left to right, holding the bistoury in the fourth position, the blade is introduced flat, about the middle of the first incision; and, when the point reaches the spot where it is wished to stop, the edge is turned upwards, and the point is made to project through the skin; this part of the incision is finished by giving the handle a swinging movement, and drawing it towards one. The other section is performed in the same manner, only the operator is obliged to effect with his hand a movement of rotation from above downward, in order to introduce the bistoury beneath the skin, that he may bring it out on the side next to him. This last method is more pain-

ful than the other; and, if the first be performed with proper precautions, it deserves always to be preferred.

After making the incision, to dissect up the flap, we seize its point, with the thumb and fore finger of the left hand, and then carry the bistoury from one angle to the other, changing the position alternately from the first to the second; thus successively dissecting up all the flaps. This manner of varying the position of the bistoury, in all dissections of this kind, saves much time, and gives gracefulness to the operator.

### *The T Incision.*

This incision is performed exactly as the crucial is done, except that we only make a single incision on that which has been made, from left to right. The flaps are dissected up in the same manner.

### *The V Incision.*

The bistoury is held in the third position; the second incision ought to fall in with the first, at a more or less acute angle. The flaps are dissected up, by carrying the blade of the bistoury from one edge of the divided skin to the other, which is held between the thumb and fore finger of the left hand, as mentioned in the crucial incision.

### *Elliptic Incision.*

This is often used in surgical operations, to extirpate schirrus breasts, tumours of considerable size, and on all occasions where a small portion of integument is to be removed along with the diseased part.

The operator stretches the integuments on the side next him with the ulnar edge, or the fingers of, his left hand, while an assistant stretches them on the other side. Holding the bistoury in the third position, the operator makes the first incision on the side next him, beginning

always toward the lower part of the tumour, and finishes it from left to right. The second is made in the same manner, taking care to connect the two extremities with those of the preceding incision. To facilitate the flow of pus, the axis of the semilunar incision ought to make an angle of  $45^{\circ}$  with the axis of the body. The cyst of the tumour is next to be dissected out, proceeding always from below, upwards; for otherwise the blood will conceal the parts that remain to be dissected. This is a general rule for all such dissections, which ought also to be made parallel to the course of the muscular fibres.

*Incision to correct deformities resulting from cicatrices on the Face or Neck.*

When cicatrices have been left on the skin of the neck by scrofulous tumours which have suppurated, we circumscribe them by two incisions; dissect up, and remove the skin comprised between the cuts; then the wound is healed by the first intention, bringing the parts together by adhesive straps. But, if the edges of the incision cannot be approximated on account of their too great distance, or adhesions, we detach the skin by cutting the subjacent texture, as in operating on the lips, and then the union takes place very easily. When the wound is healed, if any traces of the incision remain, they resemble the folds of the neck, especially if they have been made, as they should be, in a transverse direction. The same operation may be employed for large cicatrices, which disfigure the countenance; we may, if it be necessary, even secure the edges of the wound with pins.

*Incision to avoid penetrating a cyst, or any important cavity.*

In making a perpendicular incision with a straight



bistoury, we may penetrate a cyst which we intend to remove, and empty it entirely, which will render the dissection very difficult, if it does not make it altogether impossible. We may penetrate an important cavity, such as the chest, the abdomen, a hernial sac, &c. To avoid this, we adopt the following method:—

We use a bistoury with a convex blade, which should be held very horizontally in the fifth position. The integuments are divided little by little, avoiding to raise the handle of the instrument for fear of introducing its point into the cyst: the same movement and the same precautions are repeated until the part desired is exposed; should it be an abscess, it must be dissected down to its base, and removed.

*Opening of abscesses situated among parts supplied with numerous nerves and blood vessels.*

When an abscess is deeply seated, and we must penetrate beyond, a nervous plexus or numerous blood vessels as may happen in the neck, for instance, it will be dangerous to open it with a cutting instrument. In this case, LISFRANC advises the following method:

First make a longitudinal incision through the skin. Then penetrate beyond this first incision with a director, moving it from left to right, and from before, backwards, by which we dilate the opening sufficiently to allow the pus to escape. By this mode, it is impossible to wound either the nerves or arteries.

*Counter opening.*

After making a longitudinal incision, we take a grooved director, curved near its point; we then take the handle between the thumb, index, and middle fingers of the right hand, to introduce it to the point, where the counter opening is to be made. The hand is then changed, in order to ascertain with the end of the right

fore finger whether there be not an artery or nerve between the point of the director and the integument it elevates. Then, holding the bistoury in the fifth position, we cut horizontally for half a line beyond the point of the director. We then change the fifth position of the bistoury, for the first, to introduce the blade into the groove for the space of half an inch or an inch, turning the edge upwards: we bring it to the perpendicular, to cut the parts situated in front of the edge.

*Dilatation of an opening, on the grooved director.*

The handle of the director being held as in the preceding case, the point is introduced by the open extremity of the fistula. We then take a straight bistoury in the right hand, after having seized the handle of the director with the left, then holding it in the fourth position, the edge upwards, the blade is introduced into the groove in the length of the director, and we cut by raising the handle of the bistoury until its point arrives at the blunt end of the director: then we force upwards the point of the instrument to pass it through the skin; and by depressing the handle we finish the incision as directed for the crucial incision. The director is to be withdrawn when the incision is finished.

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## LIGATURE OF ARTERIES IN GENERAL.

The art of applying ligatures to arteries with the proper degree of constriction, is of the highest importance in the performance of surgical operations: the following precautions are to be observed in all cases where ligatures are used.

The fingers of the left hand should be applied on the skin, in a direction parallel to that of the incision; not only to trace its course and determine its extent, but also to tighten the integuments. The ligatures ought to be round and compact; such as are made with a sim-



ple waxed thread, are commonly sufficiently strong to cause the necessary constriction.

The artery should be denuded as little as possible; yet it should be dissected clean towards the point where the ligature is to be placed. This, applied transversely to the axis of the artery, must be drawn with sufficient force to rupture the internal and middle membranes, taking care not to include the nerves and veins which accompany the artery in the ligature. As the ligature is a foreign body, it should be made as small as possible; therefore, we cut off one of the ends, unless Lawrence's method is preferred, which consists in cutting off both ends of the ligature near the knot.\* Should the patient faint during the operation, it is not necessary to unite the parts before he recovers his senses, in order to ascertain by the hemorrhage whether any more vessels still remain to be tied. Such is the English method, advocated by JONES. In France a flat ligature is commonly used, formed of several strands of thread placed together, and united by being waxed. To pass this ligature under the artery, a grooved director is used, slightly curved towards its point, the curved needle carrying the ligature, or the needle fixed in a handle.†

\* This may be very advantageously done when the ligature is composed of animal matter, especially if of buckskin dressed for the purpose. This material does not prevent the wound from healing by the first intention, and is gradually and certainly removed by the absorbents of the part. We have seen ligatures of this kind used in several capital operations, and always with great apparent advantage. The introduction of them into practice is attributed to Dr. PHYSICK, who is justly considered, in all respects, a "SURGEON" of the highest value to his country.—J. D. G.

† One of the earliest descriptions and figures of this instrument, is given in the works of Ambrose Paré. A very admirable instrument for taking up deep-seated arteries was devised

The last is preferable, because it is not liable to pierce the nerves or veins accompanying the artery. The ligatures commonly fall off about the fifteenth or twentieth day, after having produced a division of the artery.

SCARPA properly objects to this ligature, on the ground that the obliteration of the artery being produced solely by the cellular tunic, the serious accident of a consecutive hemorrhage often results; he therefore recommends what he calls the *temporary* ligature, as of very great importance.

It should be made of two waxed threads placed parallel to each other, so as to form a small flat tape. Between this and the vessel a little roll or cylinder of linen spread with cerate is placed. The length of this cylinder should be such as not to exceed the breadth of the ligature more than a line, or a very little more above and below: the breadth of the ligature should be about a line for a large artery of the limbs. The constriction produced should not be excessive; it should be sufficient only to bring the internal walls of the artery into contact. The ligature should never be placed near the origin of a large lateral branch.

Numerous experiments having demonstrated that adhesive inflammation was sufficient at the end of three days, to maintain the internal coats of the artery in contact, and produce a solid and durable obliteration of its caliber; and, as after that time, the ligature serves no purpose but that of causing ulceration of the part to which it is applied, SCARPA advises that it should be removed: in order that the removal may be effected with-

some time since by our distinguished countryman Dr. PHYSICK, with the use and excellence of whose *forceps* for securing deep-seated arteries, nearly all our practitioners are acquainted; nor need any other instrument for this purpose be recommended to the surgeon.—J. D. G.

out pulling, or too considerable a dilatation of the wound, he has invented the following simple method of doing it.\*

He takes a common grooved director, slit at its inferior extremity, for the length of half an inch: to one of the edges of this director are fixed two small flattened rings, the greatest diameter of which is proportioned to the breadth of the tape, used for the ligature. One of these rings is situated half a line above the inferior extremity of the director; the other a little below its handle: the director has a very narrow furrow at the bottom of the groove throughout its whole length. A small knife with a convex cutting edge is employed, whose blade should not be more than five lines long, and sufficiently slender to glide easily in the groove of the director; its blunt point should penetrate with facility the furrow at the bottom of this groove. At the base of the little knife there is a button, which prevents the blade from advancing farther beyond the slit in the director than the length of its edge.

The end of the ligature dependant from the wound is passed first through the inferior, and then through the superior ring of the director. By the aid of this very sure guide, the director is gently introduced to the bottom of the wound, until the lower ring rests solidly on the knot of the ligature. Then, the tape passed through the rings is tightened, by drawing it lightly and fixing it around one of the wings of the director, so that the lower ring cannot move in any manner. We take care to place the sound in such a manner as to have the groove exactly in the same direction as the tied artery: to secure this, it is sufficient that the wings of the director be transverse to the course of the vessel. Thus pre-

\* A translation of Scarpa's very interesting observations and experiments on the application of ligatures, will be found in the 2d vol. new series, of the Philadelphia Medical and Physical Journal.—J. D. G.

pared, the operator holds the director in one hand, while with the other he conducts the little knife as vertically as possible into the groove. When the blade arrives at the commencement of the slit, it descends vertically and without varying between the two edges, comes upon the ligature near the knot, and transverse to its direction. It is then sufficient to support the blade lightly, and give it a slight sawing motion,<sup>†</sup> to cut the ligature immediately upon the cylinder which secures the artery from all injury. We begin then by removing the cylinder with very small forceps,<sup>\*</sup> and carefully withdraw the director which brings the ligature away with it.

#### LIGATURE OF ARTERIES IN THE SUPERIOR EXTREMITIES.

##### *Ligature of the radial artery near the wrist.*

Make an incision about two inches long in the direction of a line, which running from the styloid process of the radius, would pass between the condyles of the humerus: we find the artery superficially seated along the internal edge of the supinator radii longus; raise it with the grooved director and tie it.<sup>†</sup>

##### *Ligature of the ulnar artery near the wrist.*

Make an incision two inches long in the length of the external edge of the flexor carpi ulnaris; beginning half an inch below the pisiform bone. Divide the fascia; the assistant then draws the inner edge of the wound

<sup>\*</sup> To avoid using such forceps, it is only necessary to pass a small thread through the cylinder, as recommended by GIUNTI previous to using it. By means of this thread, the cylinder is easily removed after cutting the ligature.

<sup>†</sup> The curved needle is generally all that is necessary for passing ligatures under superficially seated arteries; the same needle passed under the vessel by means of PHYSICK's forceps, is quite sufficient for taking up deep seated vessels.—J. D. G.

towards the radius: the operator dissects cautiously along the tendon, and discovers the artery situated on the outside of the ulnar nerve; then raises and ties the vessel.

*Ligature of the radial artery at the upper part of the fore-arm.*

[LISFRANC'S METHOD.]

Supinate the fore-arm, and draw a line, which starting from the middle of the space between the condyles of the humerus, shall finish on the external side of the radius, about three inches and a half from where it begun. Draw a second line, which departing from the inferior extremity of the first, by remounting on its outside towards the external condyle of the humerus, will form with it an angle, whose base situated near the articulation of the fore-arm and humerus, will be little more than half an inch in width. On this second line, half an inch below the articulation the incision is to be made. We divide the fascia, and by tightening the skin towards the outside of the radius, we arrive at the first intermuscular space, which we find directing towards the ulna, precisely in the line pointed out. We penetrate this interspace carefully, and find the artery situated on the inside of the nerve. We insulate it, and then pass the ligature.

*Ligature of the ulnar artery at the upper part of the fore-arm.*

The limb being supinated, begin at three fingers breadth below the internal condyle of the humerus an incision, to be continued for the length of three inches on the anterior and a little on the internal face of the ulna. After dividing the skin and fascia, we tighten them towards the inside of the arm, with the thumb and fingers of the left hand, and search for the first intermuscular



space, which we find by looking from this, towards the opposite side. We carefully penetrate this interspace formed by the flexor ulnaris, palmaris longus and flexor sublimis, and find the artery situated external to the nerve. When the muscular system is much developed, or the subject is thin, it is useless to take all the precautions indicated in commencing the incision, because in cases where the intermuscular spaces are well marked we cut directly on them, provided we have learned how to distinguish them.

When we take up these small arteries after any other wound than that caused by amputation of the limb, as they have numerous communications with other arterial branches, it is necessary to secure both extremities of the divided vessel. In this case we commonly enlarge the incision; but when the artery is completely divided, its ends retract, the blood flows, and it becomes very difficult to find the vessel whence it escapes. On this account we first enlarge the incision, on the side next the heart, to tie the extremity on that side: then we find the other much more readily, which supplies all the blood that can continue to flow.

*Ligature of the brachial artery near the articulation of the arm and fore-arm.*

This artery may be injured in opening the basilic vein and cause an aneurism, which may require an operation. *Dominic Anel*, a French military surgeon, is thought to have been the first who used the ligature in such a case, without opening the aneurismal tumour.\* This operation may be performed in the following manner:—

Two inches below the external condyle of the humerus, we commence an incision, two inches in length,

\* See a very interesting case described by Dr. Physick, in Coxe's Medical Museum and in Dorsey's Elements of Surgery.

along the inside of the biceps muscle. We cut the skin, cellular substance and fascia, and come upon the median nerve, immediately behind which the brachial artery is found. The nerve is to be separated from the artery and the ligature passed.

*Ligature of the Brachial artery, near the middle of the arm.*

The limb is to be supinated; the operator searches with the point of his fore finger for the median nerve along the internal edge of the biceps muscle, to assure himself of the direction of the artery which follows that of the nerve; then he makes an incision extending two inches along the inner edge of the biceps towards the middle of the arm. The median nerve is exposed by this first incision, and the brachial artery is found situated at its inner side.

It may happen, though very rarely,\* that the brachial artery bifurcates before arriving at the articulation; when this is the case the division commonly occurs in the axilla, and the two branches run parallel on each side of the biceps until they arrive at the fold of the elbow, whence they continue as usual.

*Ligature of the axillary artery.*

[LISFRANC'S METHOD.]

A wound, or aneurism of the artery may exist near the upper part of the arm; in this case, we apply the ligature on the artery in the hollow of the arm-pit, in the following manner:—

Supposing the axillary space to be divided into three

\* This division of the brachial artery occurs much more frequently than is generally imagined; numerous instances have presented themselves during the dissections of a single season. I have published a statement of these cases in vol. i, new series, of the Philadelphia Medical Journal.—J. D. G.

equal parts, comprised between the edges of the latissimus dorsi, and pectoralis major and minor, we make an incision about three inches long at the junction of the two anterior thirds with the middle one, beginning directly over the head of the humerus, in the direction of a line which would continue the division already indicated. We then encounter the axillary plexus, and the median nerve, under which the artery is situated.

After the integuments are divided, the blade of the knife must be as little used as possible, for fear of injuring the nervous, arterial and venous branches existing in this situation.

*Ligature of the subclavian artery below the clavicle.*

[LISFRANC'S METHOD.]

This operation is performed in cases of axillary aneurism.

Extending the arm and carrying it backwards to put the pectoral muscle on the stretch, observe the depression formed by the union of the clavicular and sternal portion of this muscle; the incision should be made in this direction, by commencing half an inch from the sternal extremity of the clavicle, below this bone, and continuing for about three inches along its outer edge. The two portions of the muscle are to be separated from one extremity of the incision to the other, following the direction of the muscular fibres. If the interstice does not exist, the muscle must be divided by the edge of the knife, in the corresponding direction. We now bring the arm towards the body, in order to relax the muscles, and at the same time to enlarge the opening of the wound; about one-third of the length of the clavicle from its sternal extremity, we find the vein situated immediately before the artery, which is often con-



cealed under a great quantity of fat and cellular tissue. A great deal of caution is necessary to avoid injuring the vein; to effect this we are advised to employ the handle of the scalpel, or the finger nails. After dividing the muscle and cellular tissue, the artery is to be raised and tied.\*

*Ligature of the subclavian artery above the clavicle.*

[LISFRANC'S METHOD.]

Make an incision three inches long, immediately above the superior edge of the clavicle, by commencing half an inch from its sternal extremity, or towards the outside of the sterno-cleido-mastoid muscle, and continue it in the direction of a line that would terminate at the other extremity of the clavicle. We cut the skin, platysma myoides, and cellular texture, avoid the vein which crosses the artery almost at a right angle, and introduce the fore finger of the right hand into the wound, to search for the bony tubercle which exists on the superior and anterior border of the first rib; the artery is constantly situated on the outside of this tubercle. The nerves composing the axillary plexus are found somewhat below, on its outside. The depth at which the artery is situated sometimes causes many difficulties in passing the ligature around it.

*Ligature of the common carotid artery.*

Hardor relates a case of ligature of this artery which was performed at the hospital of *Charity*, according to the ancient method, which consisted in opening the sac, and placing a ligature above and below the tumour; but

\* See Dr. PARRISH's paper on the ligature of this artery, accompanied by an excellent plate in the 3rd volume of the *Eclectic Repertory*.—J. D. G.

the hemorrhage was so profuse that the patient died under the hands of the operator. Astley Cooper was the first who practised the ligature of the common carotid in a case of aneurism without opening the sac; since that time it has been performed frequently with success.\* The following method is to be employed:—

Make an incision two inches and a half long, by beginning from the external and inferior side of the thyroid cartilage, and continue it upwards along the inside of the sterno-cleido mastoideus, so as to form an angle with the thyroid cartilage. Dissect carefully along the muscle, which is to be pressed a little outwards. We avoid the internal jugular vein placed somewhat in front and on the outside of the artery; the pneumogastric nerve is below, towards its outside; the whole enveloped by a membrane of cellular tissue, forming a species of sheath. We tie the artery at the point where it comes from, under the sterno-mastoideus and omohyoideus muscles.

#### LIGATURES OF THE ARTERIES IN THE INFERIOR EXTREMITIES.

##### *Ligature of the arteria dorsalis pedis.*

The leg being flexed on the thigh, and the sole of the foot placed on a solid plane, we make an incision two inches long over the instep, in the direction of the second toe. After having divided the integuments and

\* This artery has been very frequently taken up in the United States with success, both in cases of aneurism, and previous to the removal of large fungous tumours of the antrum.

The young surgeon should be very careful in deciding as to the necessity of taking up this vessel, and not be induced to undertake it from the facility and success with which it has been done. Certainly in some of the cases in which this operation has been resorted to, it might have been dispensed with, as well as much suffering and risk, have been avoided.--J. D. G.

dorsal aponeurosis of the foot, we come on the tendon of the long extensor of the great toe, situated at the inside of the foot, and the first tendon of the extensor brevis digitorum pedis. We there find and secure the artery.

*Ligature of the posterior tibiale artery behind the inner angle.*

Make an incision about half an inch long below, an inch and a half long above the inner angle, and two lines behind it. We meet there with a thick aponeurotic layer, and when this is divided, the artery presents itself.

It is important, as LISFRANC teaches, to keep two lines behind the malleolus; lest we divide the sheaths of the tendons.

*Ligature of the posterior-tibial artery near the middle third of the leg.*

[LISFRANC'S METHOD.]

After making an incision about three inches long, departing from some point of the tendo achilles, below the malleolus internus, ascend almost obliquely to near the tibia, cutting the skin and cellular substance. The vena saphena interna is to be avoided. We cut the aponeurosis, and glide the fore finger into the inferior angle of the wound, its palmar surface turned against the anterior surface of the tendon, distinguishes its smoothness. The finger is then moved from the inner towards the outside, and from below upwards, to separate the muscles; if we encounter aponeurotic bridles, they are to be divided by the bistoury; then the posterior tibial artery is found, having outside of it the posterior tibial venous trunk, and the nerve on the inside.

*Ligature of the posterior tibial artery near the upper third of the leg.*

[MARJOLIN'S METHOD.]

Flexing the leg on the thigh, we make an incision, dividing the skin and aponeurosis along the internal edge of the tibia, from the posterior and internal part of its tuberosity to near the middle of the leg. We then cut the adherences of the solæus muscle, by shaving along the edge of the tibia; an assistant turns the solæus and gastrocnemius internus from behind forwards; the operator cuts the aponeurosis, passing behind the artery and the three deep seated muscles of the leg, and exposes the artery.

*Ligature of the anterior tibial artery near the middle of the leg.*

[LISFRANC'S METHOD.]

Extending the leg, and resting it on its posterior surface, we commence an incision on the outside of the spine of the tibia, which should ascend obliquely from within outwards, so that its upper part shall be an inch or an inch and a half from the spine of the bone, according to the development of the muscular system. Dividing thus the skin and cellular texture, we cut transversely through the aponeurosis of the leg with the bistoury. This incision gives us the advantage of being constantly parallel to the muscular fibres: we next enter the first inter-muscular space from the spine of the tibia, where we find the artery between the tibialis anticus and the extensor longus pollicis pedis, immediately on the inter-osseous ligament, having the anterior tibial branch of the sciatic nerve on its outside, and its accompanying vein on the inside. When this artery is cut, it is necessary to apply a ligature on both ends of the vessel, as must also be done when small arteries in the superior extremities are divided.

*Ligature of the peroneal or fibular artery, somewhat below the middle of the leg.*

[LISFRANC'S METHOD.]

An incision is made, which departing from some point on the outside of the tendo achilles, ascends obliquely outwards, and terminates on the external and posterior surface of the fibula. We must be careful to avoid cutting the saphena externa, which is exposed by this incision: the aponeurosis is next divided: the fore finger is introduced under the tendo achilles, as in the ligature of the posterior tibial artery; the finger ascends before the superficial muscles to separate them from the deeper seated. We cut the aponeurosis, which is passed behind the deep seated muscles; we raise and turn outwards the inner edge of the flexor longus pollicis pedis, and we find the artery sometimes situated between the fibres of this muscle, and at others between this muscle, the fibula, interosseous ligament and tibialis anticus. The peroneal artery is not to be sought towards the lower third of the leg, because we should find nothing but its posterior branch.

If there be any doubt as to the vessel from which blood flows, and we cannot determine whether the peroneal or the posterior tibial is wounded, we may cut down, as if for the ligature of the peroneal artery, since the same incision will serve to discover the posterior tibial.

*Ligature of the popliteal artery towards its inferior portion.*

[LISFRANC'S METHOD.]

If we are not sure what artery is wounded, and wish to stop the circulation at the same time in the anterior and posterior tibial and peroneal branches, we may place a ligature immediately above the division of these arteries, in the following manner:

Extending the leg, and resting it on its anterior face, we make an incision for three or four inches along the median line of its posterior part, commencing several lines above the articulation of the knee. The skin, cellular tissue and aponeurosis being divided in the median line, nevertheless, more on the outside than the inside, because the size of the gastrocnemius internus is somewhat more considerable than that of the externus, we find the intermuscular space; separate cautiously, all the parts before us, until we arrive at the inferior portion of the popliteal artery.

By prolonging this incision somewhat, we may tie the posterior tibial and peroneal arteries at their upper part. The same incision may serve for the posterior tibial trunk. In addition, this method enables us to expose all the arteries of the leg at the same point, and establish a certain diagnostic of the seat of hemorrhage in a doubtful case.

### *Ligature of the popliteal artery.*

#### [LISFRANC'S METHOD.]

The extended thigh and leg rest on their anterior surfaces. We make an incision, which departing from the inside of the base of the triangle composing the popliteal space, terminates at the apex of the same triangle.

The cellular tissue and crural aponeurosis are to be divided, and should the saphena vein be in the way it is to be avoided. Next comes the great sciatic nerve, which is also to be pushed out of the way, towards the outside of the wound. We divide the fatty matter in front of the nerve with the extremity of the director or the handle of the scalpel. We then find the popliteal vein which is to be separated from the artery, and the latter secured by the ligature. It is well to observe that after making the incision we may slightly flex the leg on the thigh, to relax the muscles of the artery.



*Ligature of the crural artery near the middle of the thigh.*

[LISFRANC'S METHOD.]

The limb being in a state of semiflexion, and lying on its outside, we make an incision three inches long, which departing from the superior extremity of the inferior third of the thigh, courses along the lower edge of the sartorius muscle, in the space midway between the latter and the gracilis. We divide the skin, cellular tissue and aponeurosis; exposing the inner edge of the sartorius, we easily recognize this muscle by the course of its fibres. Next, raising this edge, we find the crural artery covered by an aponeurotic layer, which is divided in order to arrive at the artery.

*Ligature of the crural artery near the fold of the groin.*

The patient is placed on his back, and the limb to be operated on is semiflexed; we begin an incision half an inch below the ligament of Paupart, over the middle of the crural arch: it is to be continued three inches downwards, following the direction of a line which would rather approach the internal than the external edge of the thigh, parallel to the course of the artery. The internal saphen vein, exposed by this incision, is to be avoided; then we divide the fascia, fatty texture, and arrive at the sheath of the vessels; we cut this cautiously, and the artery presents itself, bounded on the outside, and in front by the anterior crural nerve, and also by the crural vein. We raise the artery with the director and apply the ligature.

*Ligature of the external iliac artery.*

After shaving the pubis on the side to be operated on, we commence the incision, an inch within and a line or two below the anterior superior spine of the ilium; it is

to be continued in a semilunar form, in the direction of Paupart's ligament, until it terminates precisely over the external abdominal ring, which will make the whole cut a little more than three inches long. We divide the external oblique exposed by this incision; raise it, and successively encounter the internal oblique and transversalis. The edges of these muscles are to be raised with the finger or the handle of the scalpel, and the spermatic cord is exposed; we pass the finger behind it to push away the peritoneum, and we find the artery bounded by the vein on its inner side, and exactly enclosed by a cellular membrane, which must be cautiously divided. Care is to be taken after cutting the tendon of the external oblique, to use the edge of the knife as little as possible, in order to avoid injuring the epigastric artery, which is commonly situated towards the internal extremity of the incision, crossing the direction of the spermatic cord. This accident happened in 1821, to Mr. DUPUYTREN, at the Hotel Dieu of Paris: the hemorrhage was so profuse that he was obliged to apply two ligatures to the vessel to arrest it.

### *Ligature of the internal iliac.*

The patient lying on his back, we make an incision five inches long over the inferior and lateral part of the abdomen, in a direction parallel to that of the epigastric artery, about an inch and a half from the outside of this vessel. The skin, fascia and muscles, are successively divided; after having destroyed the connexions of the peritoneum with the psoas and iliac muscles, we reverse it by pressing it inwards in the direction of the ~~anterior~~ superior spine of the ilium and the first division of the iliacs. We pass the fore finger of the right hand into the wound, to seek for the artery, and while we hold it with that finger, pass the ligature with the other hand.

*\* Posterior -*



### *Ligature of the aorta.*

In a case of aneurism of the primitive iliac artery, where there was no other chance of saving the patient, Astley Cooper attempted this operation, after having assured himself, by experiments tried on dogs, that the circulation could be carried on by the collateral branches, when the aorta was obliterated. This case was published in the first volume of the *Surgical Essays*, whence we have extracted the following description:—

“The patient’s shoulders were slightly elevated by pillows, in order to relax, as much as possible, the abdominal muscles; for I expected that a protrusion of the intestines, would produce embarrassment in the operation, and was greatly gratified to find that this was prevented by their empty state, in consequence of the involuntary evacuation of fæces; and here let me remark, that I should, in a similar operation, consider it absolutely necessary, previously to empty the bowels by active aperient medicines.

“I then made an incision, three inches long, into the linea alba, giving it a slight curve to avoid the umbilicus; one inch and a half was above, and the remainder below the navel; and the inclination of the incision was to the left of the umbilicus in this form [  $\frac{1}{2}$  ]. Having divided the linea alba, I made a small aperture into the peritoneum, and introduced my finger into the abdomen; and then, with a probe-pointed bistoury, enlarged the opening into the peritoneum to nearly the same extent as that of the external wound. Neither the omentum nor the intestines protruded; and during the progress of the operation, only one small convolution projected beyond the wound.

“Having made a sufficient opening to admit my finger into the abdomen, I then passed it between the intestines to the spine, and felt the aorta greatly enlarged, and beating with excessive force. By means of my fin-

ger nail I scratched through the peritoneum on the left side of the aorta, and then gently moving my finger from side to side, gradually passed it between the aorta and spine, and again penetrated the peritoneum on the right side of the aorta. I had now my finger under the artery, and by its side I conveyed the blunt aneurismal needle, armed with a single ligature behind it; and my apprentice, Mr. Hey, drew the ligature from the eye of the needle to the external wound; after which the needle was immediately withdrawn.

“ The next circumstance, which required considerable care, was the exclusion of the intestine from the ligature, the ends of which were brought together at the wound, and the finger was carried down between them, so as to remove every portion of the intestine from between the threads: the ligature was then tied, and the ends left hanging from the wound. The omentum was drawn behind the opening as far as the ligature would admit, so as to facilitate adhesion; and the edges of the wound were brought together by means of a quilled suture and adhesive plaster.

“ During the time of the operation, the fæces passed off involuntarily, and the patient’s pulse, both immediately, and for an hour after the operation, was 144 in the minute. He was ordered thirty drops of tincture of opium and camphorated mixture, and the involuntary discharge of fæces soon after ceased. I applied my hand to his right thigh immediately after the operation, and he said that I touched his foot; so that the sensibility of that leg was very imperfect.

[“ For the following particulars I am indebted to Mr. Cox, one of my apprentices.

“ At midnight his pulse was 132.

26th. “ At one o’clock in the morning, the patient complained of heat in the abdomen, but he felt no pain upon pressure: he said that his head felt hot, and that

he had pain in the shoulders; his lower extremities, which were cold soon after the operation, were now regaining their heat; his body was in other parts covered with a cold sweat. The sensibility of the lower extremities has been very indistinct since the operation.

“ At two o’clock, he felt so comfortable from his medicine that he wished to have more of it, and ten drops of tincture of opium were given him; his legs were wrapped in flannel, bottles of hot water were applied to the feet, and he then said that the heat of his belly was lessened.

“ At six o’clock the sensibility of his limbs was still imperfect.

“ At eight o’clock, A. M. he expressed himself as feeling quite comfortable; he however passed no urine, and had no evacuation; his right limb was warmer than the left, and the sensibility was returning.

“ At noon the temperature of the right limb was 94, that of the left or aneurismal limb  $87\frac{1}{2}$ .

“ At one o’clock, P. M. Mr. Cooper visited him; and as he walked up the ward, he appeared much gratified at seeing his patient, who was at the point of death the evening before, and was now adjusting his bed-clothes, and smiled as Mr. C. approached the bed.

“ At three o’clock, after a fit of coughing, the man was much alarmed with the idea of the thread having slipped into the wound: it was a false alarm; but, to prevent the idea of its recurrence, it was fastened to a quill: soon after this he complained of pain in the abdomen; it was not very severe, nor did it last long; readily yielding to fomentations. As he had no evacuation, he was ordered an enema.

“ At six o’clock, P. M. he vomited, soon after the glyster had been administered; the heat of the right leg was 96, that of the left or diseased limb  $87\frac{1}{2}$ .

“ At nine in the evening he took half a glass of port wine in warm water, which he immediately rejected; he

complained of pain in the loins; his pulse was 104, and feeble; he was very restless; and had an involuntary discharge of *faeces*.

“Eleven at night, his pulse was 100 and weak; he still vomited.

27th. “At seven, A. M. the report was that he had passed a restless night; the vomiting had returned at intervals; his pulse was 104, weak and fluttering; he complained of pain all over his body, more particularly in his head; and the carotids beat with considerable force; he had great anxiety expressed in the countenance, was very restless, and the urine dribbled from him with some degree of pain at the end of the penis.

“At eight o’clock, A. M. the aneurisinal limb appeared livid, and felt cold, more particularly around the aneurism; but the right leg remained warm.

“At eleven o’clock his pulse was 120, and weak; he appeared to be sinking. To the questions which were put to him he did not return any answer; he appeared to have an uneasiness about the heart, as he kept his hand upon the left breast. He died at eighteen minutes after one, P. M. having survived the operation forty hours.

“After being informed of his death, I requested Mr. Brookes, of Blenheim Street, to attend with me at the inspection of the body. Mr. Travers, surgeon of St. Thomas’s Hospital, Mr. Stocker, apothecary of Guy’s, and a large concourse of medical students, attended the examination.

“When the abdomen was opened, we found not the least appearance of peritoneal inflammation, excepting at the edges of the wound. The omentum and intestines were free from any unnatural colour; the edges of the wound were glued together by adhesive inflammation, excepting at the part at which the ligature projected. We were much gratified to find that the ligature had not included any part of the omentum or intestine: the

thread had been passed around the aorta, about three quarters of an inch above its bifurcation, and about an inch, or rather more, below the part where the duodenum crossed the artery. Upon carefully cutting open the aorta, a clot of more than an inch in extent was found to have sealed the vessel above the ligature; below the bifurcation, another, an inch in extent, occupied the right iliac artery, and the left was sealed by a third, which extended as far as the aneurism; all were gratified to observe the artery so completely shut in forty hours. The aneurismal sac, which was of a most enormous size, reached from the common iliac artery to below Poupart's ligament, and extended to the outer side of the thigh. The artery was deficient from the upper to the lower part of the sac, which was occupied by an immense quantity of coagulum.

"The neck of the thigh bone had been broken within the capsular ligament, and had not been united." p. 124.]

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## OF AMPUTATIONS IN GENERAL, THROUGH THE BONES, AND AT THE ARTICULATIONS.

Operations of this kind being generally regarded as very easy to be performed, are rarely found described by the hand of a master. It is nevertheless certain, that rules laid down with precision, render the practice simpler, more prompt and surer. As the course of the blood may be easily arrested by the application of the tourniquet, this operation is not attended by any immediate danger, nor does it require a great knowledge of anatomy. Any one may perform it; but if he practices the operation for some time on the dead body, he may acquire an incredible dexterity in performing it on the

living. These observations are only applicable to amputations of the thigh, leg, arm and fore-arm. Those which are performed at the articulations of the foot, hand and different parts of the body, pre-suppose an exact acquaintance with the structure of these parts.

To perform these operations well, the surgeon ought to be aided by active and intelligent assistants. In fact, whatever may be his own address, he will appear awkward in the eyes of the spectators, if he has none but inexperienced assistants; because in these circumstances, as much intelligence is required on the part of the assistants as on that of the operator. The assistants should be at least two in number; one to sustain the limb operated on, the other to withdraw the skin and muscles which may present themselves before the knife and saw, and to superintend the application of the tourniquet: a third assistant will be necessary, if the arteries are to be compressed with the hands.

When we amputate at the joints, there are some authors who think, that the whole surface of the cartilage exposed should be removed, to prevent the secretion of the synovia, which may oppose the adhesion of the parts. If this destruction of the cartilages does not accelerate the cure, it is at least free from danger.

After performing the amputation, it is necessary to attend to taking up the arteries. They are to be laid hold of in succession by means of the forceps, taking care to secure the vessel exactly between the blades of the forceps, lest we should tie one side of the artery, leaving the other gaping, did we introduce one point of the forceps into the caliber of the artery, as some practitioners advise. An assistant passes a waxed ligature around the artery, which is tied, taking care not to disengage it from the forceps by too sudden a movement. Holding the two ends of the ligature in the palms of each hand, he directs the loop over the artery with his fore



fingers. He then makes a first knot, which he tightens by supporting the backs of the two first phalanges of the thumbs against each other; a second knot is then made and drawn tight in the same manner. When all the ligatures are applied, we cut off one of the loose ends of each to diminish the bulk of these foreign bodies within the wound. The remaining ends are made into a single bundle which we always place in the most depending angle of the wound, in order to serve as a drain to the pus.

In general we unite the edges of the wound immediately after the operation; Mr. DUPUYTREN, on the contrary, allows an hour to elapse before placing the flaps in contact. This appears to be advantageous, as it often happens that the operator believes that he has no other vessel to tie, because he perceives no more hemorrhage; but as soon as the spasmodic contractions of the open arteries cease, hemorrhage comes on, and we are obliged to remove the dressings to tie the vessels which were at first not to be discovered. Mr. DUPUYTREN'S practice secures us against this accident, because we can always tie the vessels, which may still pour out blood.

It sometimes happens that the blood oozes from the surface without its being possible to perceive the orifice of the artery which furnishes it. In this case we include a portion of the soft parts by means of a curved needle conveying a ligature, which may embrace without inconvenience a part of the tissues which the needle surrounds, along with the artery.

We shall now describe each amputation in particular, by commencing with those, which, although they appear to be of slight importance to the patient, should not be thus regarded by the surgeon.

The following articles are required for the performance of amputations:—1st. a cushion or a tourniquet

to compress the arteries; 2d. a straight knife more or less long and narrow; 3d. a common bistoury; 4th. a retractor for the purpose of withdrawing the flesh when about to use the saw; 5th. a saw; 6th. artery forceps; 7th. waxed ligatures; 8th. adhesive straps and lint, compresses and a rolled bandage.\* When we amputate at the joints the saw is not necessary; when we operate on the toes or fingers, it is not necessary to compress the arteries.

#### AMPUTATIONS OF THE SUPERIOR EXTREMITIES.

##### *Amputation of the first and second phalanges of the fingers.*

In England a circular incision is first made around the finger about three lines below the articulation; next, a longitudinal incision is made on each side of the finger, extending from the circular cut to the joint, so as to form two flaps, one anterior, and the other posterior; these being dissected up, the operation is terminated by dividing the tendons and articular ligaments.

This operation is long and painful; LISFRANC's method is to be preferred.

*First period.*—The hand is pronated, an assistant keeps the sound fingers extended at the same time that he bends the one on which the operation is to be performed. The surgeon seizes the diseased phalanx by its palmar and dorsal face, between the thumb and fore finger of the left hand. Then taking a straight bistoury in his right hand, which he holds in the third position, he applies its heel perpendicularly within the sixth of an inch below the upper part of the projection, caused by the flexion of the phalanx, carries it directly from right to left, and divides successively the skin, cellular texture, tendon, and

its sheath, and part of the articular capsule. Should the tumour be considerable, the incision performed according to these principles, may be made below the articulation. In such a case, to avoid mistake, we cut on the level of the fold which exists on the palmar surface of the finger, when the second joint is to be operated on, and the sixth of an inch below it when the third joint is to be removed.

*Second period.*—The bistoury moving always from left to right, is applied on the side of the articulation on whose whole extent it rests: its edge is directed towards the operator, its handle is nearer the surgeon than its blade, that is the instrument forms in front with the axis of the finger an angle of about  $60^{\circ}$ . Thus the lateral ligament and the tissues covering it are cut.

*Third period.*—The bistoury carried in a retrograde direction, occupies the opposite lateral face of the joint; there its edge is again turned towards the operator, but the blade is nearer to him than the handle, and forms behind an angle of sixty degrees with the axis of the finger. The lateral ligament and superincumbent textures are divided. The phalanx to be removed is then taken by both its sides, the bistoury is carried around its head, glides beneath it parallel to the length of the bone for the space of three lines, and cuts a semicircular flap, large enough to cover the whole wound.

If the operator be very experienced, the periods described may be reduced to a single one. The parts being arranged as stated, the bistoury passes from left to right from the point where two-thirds of the circle is finished around the joint, and the instrument in passing over the three articular surfaces, will successively and uninterruptedly assume the three positions described. The incision then must still have an inferior concavity; we subsequently proceed as before directed. If the

finger cannot be flexed, a semicircular incision made in a direction from left to right, and proceeding from the palmar surface of one side to finish near the palmar surface of the other, would have the relative distance from the folds near the joint, heretofore indicated.

LISFRANC has also thought of amputating these joints from their palmar surfaces: the following is the description of his method:—The hand is strongly supinated, all the fingers are flexed, abstracting the one to be operated on: the surgeon applies the thumb of his left hand on the extremity of the palmar surface of the diseased finger, the second phalanx of his middle finger is placed on the dorsal face of the joint he is about to open, with whose axis, this phalanx forms nearly a right angle; thus his middle finger extends beyond the transverse diameter of the articulation. The operator armed with a bistoury held in the third position, supinates his hand, applies the flat of the instrument on the pulp of his middle finger placed below the articulation, which serves him for a point of support. The point of the bistoury is then plunged in below the fold, if it be the second phalanx, and the sixth of an inch lower if the third phalanx is to be operated on; but it is necessary that the instrument should shave the lateral and anterior faces of the articulation. When we begin to introduce the bistoury, the handle is a little less elevated than the point; and in proportion as the textures are penetrated, the instrument assumes the horizontal position, which it soon quits, because at the moment when the point appears on the diametrically opposite side, the handle in its turn becomes more elevated than the blade: then the surgeon traces along the phalanx from above downwards, for the space of half an inch, and terminates the anterior flap. Finally, the surgeon moves his bistoury at the base of the flap, on one of the lateral faces of the joint, the point of the instrument being perpendicular to

the horizon, and the edge to the axis of the articulation: the bistoury is then moved from one lateral face to the other, shaving the flaps, thus encircling the articulation, which being largely opened, is easily traversed. The phalanx is removed without making a posterior flap. Ordinarily, no ligatures are used, and the wound is healed by the first intention; dressed with adhesive straps, spread with cerate, a compress, and bandages.

*Amputation of the fingers at the metacarpo-phalangeal articulation.*

[LISFRANC'S METHOD.]

The hand is pronated; the left thumb of the operator placed on the dorsal face of the diseased finger, and his fore finger on its palmar surface; the patient is directed to move the finger, that the operator may assure himself that he touches the articulation, with the fore-finger of his left hand. The phalanx to be amputated is slightly flexed on the carpus. With a straight bistoury held in the third position, we commence an incision with its whole edge nearly over the middle of the head of the metacarpus or articulation; we cut nearly parallel to the finger bone, by lowering the handle of the instrument, which is brought back to the perpendicular, to cut the extremity of the flap transversely, in order that it may not form a point; then the handle is lowered, by carrying it towards the patient's wrist, to make on the palmar face of the finger an incision down to the articulation, exactly corresponding with the first cut. To introduce the bistoury into this articulation, the operator draws the edge of his bistoury in the length of the bone he has laid bare, until he encounters an obstacle; this is the superior head of the first phalanx: he then attempts to pass it in without effort, holding his bistoury perpen-

dicularly with the edge transverse to the joint; if unsuccessful, he attempts to introduce it a little farther back, until he plunges it into the articulation. He traverses the joint, then seizing the skin of the side opposite that where the joint was entered, with the thumb and index of the left hand to remove it from before the bistoury, he passes the whole blade between the base of the phalanx and these integuments, cuts out a flap of the same form as the first, by cutting from behind forwards, in the length of the bone, and returns the finger which had been displaced to its natural position, in order to allow the instrument to glide between the bone and soft parts.

When this operation is performed on the fore or little finger, the internal flaps of the little finger and the external one of the index finger ought to be longer than for the others.

We do not generally tie the arteries when we amputate a finger, in consequence of an accident, but if it be in consequence of chronic inflammation, the ligature should be used, because the arteries are much more voluminous in the latter case. The wound is healed by the first intention, and to keep the flaps in contact, we bring the fingers together, and secure them by a bandage, when the operation has been performed on the middle or ring finger. This method should be preferred for these two fingers, to that performed on the second phalanx, because the stump left is not only useless but deformed; whereas, after this operation, the deformity is scarcely preceptible.

Nevertheless, if it be desired to remove the second phalanx, LISFRANC advises that one or two deep longitudinal incisions should be made on the palmar face of the first phalanx, to produce an adhesion of the flexor tendon to the periosteum, by means of the inflammation resulting from these cuts. After the cicatrix has formed, we amputate the second phalanx, and the first is capable



of performing the necessary movements of flexion and extension.

*Amputation of the thumb at its carpo-metacarpal articulation.*

When the right thumb is to be operated on, the hand is supinated; and if the left thumb is to be removed, the hand is placed in a state of pronation. An assistant sustains the wrist; the operator takes hold of the diseased thumb with the thumb and fore finger of his left hand; then armed with a straight bistoury, held in the third position, he enters the edge at the middle of the space comprised between the thumb and index finger. He cuts boldly down to the os trapezium, where he arrives at the carpo-metacarpal articulation, by holding the bistoury perpendicularly, with the point turned upwards. Having reached that part, he places the edge of the bistoury in the direction of the joint, and opens it, by cutting the capsular ligaments. Then seizing the soft parts of the outside of the metacarpus, he removes them from before the edge of his knife, which he passes between the bone and the soft parts. He courses along the edge of the bone and cuts a flap proportioned to that of the opposite side. In cutting this flap, he places the thumb in its natural position, which he had displaced, in order to pass the instrument across the articulation, as above stated. The arteries are taken up, if there be hemorrhage, and the wound is healed by the first intention.

*Amputation of the little finger at its carpo-metacarpal articulation.*

[LISFRANC'S METHOD.]

The hand is supinated and supported by an assistant; the surgeon first seeks for the articulation of the metacarpus with the os unciforme. To do this, he traces with the fore finger of the right or left hand, according to whichever side he operates on, the internal edge of the fifth metacarpal bone, till he arrives at an eminence; there is the articulation: he moves the bone several times, in order to render himself more certain. He places his left thumb near this point, on the dorsal surface, his fore-finger on its palmar surface, seizing as much of the soft parts as he can, in order to draw them towards the ulnar edge of the hand. Then holding a straight bistoury in the first position, he thrusts it perpendicularly from above downwards, across the skin and muscles towards the inside of the articulation. He shaves the metacarpal bone, with the edge of the bistoury to cut a flap, which he completes by coming out a little beyond the articulation of the head of this bone with the first phalanx.

An assistant raises the flap, the surgeon dissects the integuments from the dorsal face of the bone, without cutting the tendons; this done he plunges the instrument from above downwards and somewhat obliquely from without inwards, between the fourth and fifth metacarpal, so that it will come out on the inner and anterior side of the latter, without interfering with the skin of the palmar face. To effect this, he takes it between the thumb and the first fingers of the left hand, and draws it towards the outside, while he cuts from behind forward, with the full edge of the knife, between the two bones, to come out at their phalangeal extremity. He then carries the edge of the bistoury, transversely

over the internal edge of the articulation, immediately at the base of the flap; he enters this joint by following the direction of a line, which, beginning at its inside, terminates at the middle part of the second metacarpal bone. He cuts the dorsal ligaments with the point of the knife, without seeking to penetrate them, and to divide the ligament which unites the superior heads of the fifth and fourth metacarpal bones, he thrusts the point of the bistoury in front of their joinings; then moving it on its point, by raising the handle, he cuts the interarticular ligament, and opens the joint entirely. The operation is then finished, by applying the edge of the bistoury, near its point behind the articulation to finish the section of the palmar muscles and ligaments. The vessels are secured, and the wound healed by the first intention.

*Amputation of all the fingers at their metacarpo-phalangeal articulation.*

[LISFRANC'S METHOD.]

Supposing the left hand is to be operated on; it is kept in a state of pronation by an assistant; the thumb of the surgeon's left hand is applied on the external surface of the metacarpo-phalangeal articulation of the fore finger; his fore finger is on the internal surface of the metacarpo-phalangeal joint of the little finger. Holding a narrow knife in his right hand, he makes a semi-circular incision, convex anteriorly; this incision begins at the outside and anterior part of the second metacarpal bone, goes along the points where the fingers separate from the metacarpus, to come out at the inside of the fifth metacarpal. A little dorsal flap is thus cut as far as the metacarpo-phalangeal joint; the assis-

tant pulls the integuments backwards: the operator then still proceeding from within outwards, carries the point of the instrument over the superior surface of the articulations, in their anatomical direction; opens and traverses them. If we are not much accustomed to operating, we should first open all the joints without entering them deeply, and carry the instrument successively, not between the articular surfaces, but rather on the lateral ligaments.

The operator then glides the instrument first under the palmar face of the metacarpal extremities of the index and little fingers; he next encounters all the superior and palmar extremities of the first phalanges; the wrist is placed in a semisupine position; the operator holds the diseased fingers raised with the ends of his own, and fixes his eyes on the palmar face of the hand. The heel of the knife remains nearly motionless, while the point cuts from the radial to the ulnar edge, by following the groove which terminates the palmar face of the hand internally; the assistant, moreover, sustains the fingers in proportion as they are detached, and the surgeon moves his hand towards the inner side of their articulation.

If we wish to operate with the right hand on the hand of the same side, the operation should be commenced from the inner side, and continued in a direction opposite to that which has been indicated.

In young subjects, (about until the age of puberty) as the articular extremities of the metacarpus, are not yet ossified, the cartilages may be divided with the knife; LISFRANC thinks that the operation may be made at least two or three lines above the carpo-metacarpal articulation, and that we may thus gain two or three lines of anterior, as well as posterior flap.

This method is applicable to the removal of two or three fingers. Suppose, for instance, that we wish to

amputate the middle finger and little finger of the right hand. The surgeon, after having assured himself of the depth of the joints, seizes with the thumb, fore and middle fingers of the left hand, the fingers to be removed, straightens them, and his assistant withdraws the other fingers from them. The operator conducts the bistoury with his right hand, applies its point on the palmar and external surface of the middle finger, arrives at the commissure of the little finger, and passes on its outside; arrived at the dorsal surface of the two fingers to be removed, he makes a semilunar incision, anteriorly convex, according to the principles before laid down. It is needless to repeat how the joints are to be opened.

The arteries are to be tied, and the wound healed by the first intention, taking care to place a tent in the angle of the wound, to allow the pus to flow, in case union by the first intention does not succeed: the arm is placed in a sling.

*Amputation of the wrist at its articulation with the radius and ulna.*

[LISFRANC'S METHOD.]

*First process.*—Applying a tourniquet on the brachial artery, or having it compressed by the hand of an assistant; another assistant keeps the diseased hand in a state of pronation. The operator places his two fore fingers above the articulation, the one on the radius, and the other on the ulna. He then flexes and extends the diseased hand alternately, and traces with his fingers along the cotyloid apophysis of the radius, on the extremity of which he places the end of the fore finger of his left hand, and the corresponding thumb over the extremity of the styloid apophysis of the ulna, if he

operate on the right, and *vice versa*, if he is to take off the left hand. With a straight knife he makes a semicircular incision with its convexity downwards on the dorsal part of the wrist, commencing near the thumb, and ending near the fore finger, which is not withdrawn except to avoid the edge of the knife.

The assistant draws the integuments upwards; then the operator directing the edge obliquely, enters the joint by returning the point where he ended the first incision, to that where he began; but describing a semicircle in the opposite direction, and in the anatomical direction of the superior articular surfaces of the metacarpal bones. If he does not succeed in opening the joint by this movement from right to left, he seeks to do it by returning over the articulation from left to right. The joint being opened, he glides the edge of the knife between the soft parts of the palmar face of the carpus, and shapes a flap proportioned to the extent of the wound, by shaving the bone and cutting so as to come out near the palm of the hand. Care must be taken to avoid the pisiform bone, by raising the hand.

*Second process.*—After finding the inferior apophyses of the radius and ulna, and placed the hand between pronation and supination, the operator, armed with a narrow knife, plunges the point flatwise through the soft parts, by commencing towards the anterior and internal edge of the styloid apophysis of the ulna to come out before the styloid process of the radius near the joint, if we operate on the right arm: if on the left arm, he enters from the radial side. Then he shapes a flap, by cutting towards the palm, and observing the same cautions as in the preceding case; then applying the knife to the dorsal surface, he makes a semicircular incision with the convexity downwards, similar to that performed in the first operation. Then carrying the edge in front of the styloid process of the radius, he



enters boldly into the articulation, which he may traverse with a single stroke if he directs the edge obliquely to make it describe the semicircle, formed by the superior articular surface of the metacarpal bones.

The wound is healed by the first intention, after having secured the radial, ulnar, and interosseous arteries; a tent of lint is left in the ulnar angle of the incision, to facilitate the flow of pus, if union by the first intention fails. We then place the arm in a sling, so as to form a very open angle to prevent the infiltration of pus into the cellular sheaths, should the extremity of the arm be not sufficiently dependent, which troublesome accident never occurs when the principles above indicated are followed.

*Amputation of the fore-arm towards its lower third,  
with two flaps.*

The hand is placed in a state of semi-pronation—the tourniquet is applied, over the brachial artery, or rather it is compressed by an assistant, while another holds the fore-arm in the position indicated. The operator standing on the inside of the limb as in every case of amputation of the fore-arm, seizes with his left hand the part he is to remove; he thrusts the point of a catlin from above downwards, through the soft parts, by commencing at the inner and anterior side of the ulna, to come out at the corresponding point on the external and anterior side of the radius, shaving the bone; he then shapes a flap, an inch or two long, by cutting towards the palm of the hand. He then penetrates in the same manner across the soft parts of the dorsal surface, to come out on the posterior side of the cubitus; he then cuts a flap of the same size as the first. The assistant raises these flaps, the operator carries the knife perpendicularly over the posterior surface of the ulna, to cut the tendons and

other soft parts not previously divided: he introduces the point of the instrument between the two bones, by their dorsal surface, to divide the muscles and interosseous ligament; he withdraws the knife, passes over the radius, cutting the remaining soft parts, and again introduces the knife between the two bones from their palmar face: laying them bare, he withdraws the knife, and arrives on the internal and anterior side of the ulna, to cut the remaining soft parts. By means of this incision in the shape of an 8, he entirely divides the bones, by cutting the muscular fibres, the tendons, interosseous ligament and periosteum. Taking then a retractor, having three slits at one end, he introduces the middle portion between the two bones from the anterior surface. The end not split will serve to raise the anterior flap, the hands of the assistant may indeed serve for a compress. We then take the saw in the right hand, and marking with the thumb of the left hand the place where the bone should be sawed, the limb being pronated, we saw at first with short and then with long strokes, both bones at the same time, nevertheless, in such a manner that the division of the radius may be accomplished before that of the ulna, the articulation of the latter with the humerus being more solid than that of the radius with the same bone. In using the saw, we must never bear upon it, as its own weight is sufficient to produce the necessary pressure.

We commonly secure four arteries; the radial, ulnar, and two interosseous. The two flaps are placed in contact to effect the union, by the first intention, leaving a dossil of lint in the ulnar angle of the wound.

If we operate on the right limb, and wish to employ the right hand, the point of the knife must be moved from above downwards, by beginning from the external and anterior edge of the radius and coming out in front of the ulna, and *vice versa* for the opposite side. This method is almost altogether rejected.

*Circular amputation at the middle of the fore-arm.*

Having compressed the brachial artery as before stated, and having the fore-arm held in a state between pronation and supination by two assistants, one of whom supports the limb near the wrist, and the other at the elbow, the operator places his right knee, the foot resting on the ground, under the arm, and provided with a catlin knife, which he holds with his whole hand, makes a circular incision at a single stroke around the limb down to the surface of the muscles. To do this, he passes his wrist under the limb, and pronates it strongly, to carry the edge of the knife as much as possible below the anterior face of the fore-arm, by passing over the radius: he then applies the edge, and brings it circularly towards the point of departure. The assistant draws the integuments towards the superior part, for about the height of two inches. The operator dissects the bands, which still attach the skin to the aponeurosis: then he makes another circular incision through the muscles, similar to the former one, applying the knife immediately at the base of the retracted integuments, and cutting boldly down to the bone.

The assistant raises the flesh, and the operator makes a third circular incision through the species of cone which the deep muscular layers form on the bones, while the parts already cut are drawn towards the elbow. He denudes the bone, cuts the interosseous ligament as stated in the preceding article; then securing the muscles and integuments from the action of the saw, by means of the split cloth, he pronates the limb, and saws the bone, according to the principles indicated in the foregoing article.

We may also perform the amputation with two flaps at the same place. We tie the vessels and unite the wound by the first intention, so that the angles of the

wound correspond, one to the radius, and the other to the ulna; leaving a dossil of lint in the angle of the wound.

If necessary, the same operation may be performed near the cubito humeral articulation.

*Amputation of the fore-arm at the elbow joint.*

Although the cure is commonly delayed for a long time after this operation, and it is perhaps more convenient to amputate the humerus, in cases where we might cut it off at the elbow joint, we shall nevertheless describe the manner of doing it.

[DUPUYTREN'S METHOD.]

The brachial artery is compressed by the hands of an assistant, or by the tourniquet: two assistants support the limb in a state of supination, the one holding above, and the other below the elbow. The operator standing on the inside, and provided with a common amputating knife, penetrates the soft parts by the internal and anterior side of the condyle of the humerus, to come out at the anterior edge of the external condyle; he shapes a flap about three inches long, shaving along the radius and ulna, and directing the incision towards the hand. One of the assistants raises the flap; the operator cuts the skin and muscles of the posterior side, as if for the purpose of making a circular incision, by entering directly into the radial articulation, on which he first carried the blade of the knife. If he be not much accustomed to operations, he need not enter the articulation until after he has exposed it by the anterior and posterior incision, and by turning his knife a little obliquely towards the bones of the fore-arm, in the direction of the joint. The olecranon is then denuded towards its base and sawed,

to preserve the adhesion of the tendons of the triceps to this process.

If we wish to disjoin the olecranon, we cut the capsular ligament, by carrying the handle of the knife obliquely towards the posterior face of the humerus, and by tracing with the edge along the inside of the olecranon to divide the tendons and ligament; then we bring the edge obliquely upon the outside; divide the tendon of the triceps and the ligament; the ulna is then luxated backwards; pass the knife between the superior extremity of the process and the articular surface of the tuberosity of the humerus, and finish the section.

The arteries are then tied, and the wound healed by the first intention: a pledget of lint is to be left in the internal angle of the wound, to allow the escape of pus to take place.\*

*Amputation of the arm at some point below the shoulder joint.*

The patient is to be seated; the brachial artery is compressed by the hands of an assistant or by a tourniquet; two assistants sustain the arm in a state of semi-extension, one by its lower, and the other by its upper part. The operator is placed on the outside, with his right knee on the ground, and the other flexed in front.

\* Where several ligatures are to be left pendent from the interior angle of the wound, it may be permitted us to doubt the propriety of keeping any other foreign substance in it, to allow of the flow of pus. Under all circumstances, as much of the surface as possible should be permitted to heal by the first intention, which will be most certainly effected by bringing the flaps accurately together, supporting them by adhesive straps, and having as few foreign bodies as possible in the wound.

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In this position he passes the hand holding the knife under the diseased arm, making a strong movement of pronation, to begin a circular incision on the outside, which he terminates at the point whence he departed, by raising himself gradually as his incision advances. The assistant placed at the upper part draws the integuments towards himself, for about two inches, according to the thickness of the muscles; if the skin is retained by little bridles, the surgeon cuts them; then regaining his first position and makes a circular incision near the base of the retracted skin, cutting boldly through the muscles down to the bone. The assistant again raises them, and the surgeon re-applies his knife on the deep layer of muscles, which forms on the bone, a cone with the point downwards: directing the edge obliquely upwards, he makes a third circular incision down to the bone which he denudes of its periosteum.

He applies the thumb of his left hand on the point which is to be sawed, to direct the first strokes of the saw; takes this instrument in his right hand and saws the bone without employing pressure.

The arteries are tied; the wound is healed by the first intention, by bringing the edges of the wound together so as to form an anterior and a posterior angle; a dossil of lint is left in the posterior angle, to allow the flow of pus in case the union by first intention does not take place.

The amputation of the arm, with two flaps may also be performed, so as to have one of their angles on the anterior and the other on the posterior side of the bone.

### *Circular Amputation of the Arm at the shoulder joint.*

There is an endless variety of methods for the removal of the arm at the shoulder joint, which it would be



superfluous to describe: we shall therefore content ourselves with describing such as are generally followed.

[BECLARD AND DUPUYTREN'S METHOD.]

The subclavian artery is compressed by an assistant against the first rib, above the clavicle; another assistant holds the arm up nearly at a right angle with the trunk; the surgeon applies the heel of his knife on the middle of the free extremity of the acromion; he directs it downwards and backwards, and after having traversed the space of about two inches, he directs it towards the hollow of the axilla, whose posterior border he divides at a point which would intersect a line departing from the centre of the joint and forming an angle of about forty degrees with the centre of the shoulder, to form a posterior flap, when the posterior and external side of the articulation will be laid bare. The surgeon changes the knife at once, makes a second incision, which starting from the same point of the acromion, and performed in the same manner, divides the anterior border of the axilla to form the anterior flap. The two flaps are raised: then, after having cut the capsule and tendons inserted on the head of the humerus, the operator passes the knife between the bone and the glenoid cavity, and separates the arm from the trunk, by cutting a small inferior flap, which contains the artery and brachial plexus.

[LARREY'S METHOD.]

The patient being seated in a chair, the artery compressed by one assistant, while the other lightly withdraws the arm from the body, the surgeon introduces the point of a long amputating knife under the skin and deltoid muscle immediately below the acromion towards

its posterior edge; shaves the head of the humerus, and comes out at the anterior border of the axilla, on the side opposite that at which it entered. Then he cuts downwards and outwards, and separates the deltoid and latissimus dorsi from the humerus to form the posterior flap. He introduces the point of the knife in the same manner, but between the inner part of the humerus and the soft parts which are fixed to it, and cuts an anterior flap corresponding to the posterior.

[LISFRANC'S METHOD.]

This method excels all the others in the promptitude with which it may be performed. A practiced surgeon may detach the arm in the lapse of four or five seconds. The following is the description given by its author.

*First period.*—If the left arm is to be removed, the upper part is held three or four inches, separated from the trunk. The surgeon places himself behind the patient, and grasps the thick part of the shoulder with his left hand; his thumb is situated on the posterior face of the humerus; the fore and middle fingers are placed on the triangular space comprised between the scapular extremity of the clavicle, the coracoid process, and the head of the humerus. Then the operator takes a catlin knife eight inches long, and about eight lines broad, and plunges it parallel to the humerus on the outside of the posterior border of the armpit, before the tendons of the latissimus dorsi and teres major. The blade forms with the axis of the shoulder an angle of  $45^{\circ}$ ; the knife transfixes the posterior and external face of the humerus and arrives under the acromio-clavicular space: then we give it a swinging movement, which slightly lowers its point, the handle raised and separated two or three inches from the arm, to the point where the instrument forms, with the axis of the joint, an angle of  $50^{\circ}$  or  $35^{\circ}$ .

The surgeon then presses directly upon the knife which traversing the articulation, comes out on the external side of the triangular space mentioned; finally, while the handle of the instrument remains nearly motionless, the end of the blade cuts from within outwards, somewhat from below upwards, and passes round the head of the bone: as soon as the point is discharged from between the bone and the acromion, it moves in the same line as the heel; the instrument follows the outside of the arm and terminates the flap at three inches from the articulation. An assistant raises this flap immediately.

*Second period.*—The surgeon holding the band low, and cutting from the heel to the point of the knife, glides it from behind forwards to the inner side of the head of the humerus; the instrument, whose handle becomes perpendicular to the horizon, traces along the bone to two or three inches below the articulation, and before the surgeon has completely detached the arm, by an incision perpendicular to the muscular fibres, an assistant placed behind the patient compresses the axillary artery between his thumbs placed on the bleeding face of the flap, and the four last fingers of each hand fixed on the integuments of the internal and anterior face of the limb.

The posterior flap contains the external extremities of the latissimus dorsi, the teres major and minor, the supra and infra spinati, the long portion of the biceps, the scapular head of the triceps, all the acromial portion of the deltoid, and almost all that which attaches itself to the clavicle, outside of the coracoid apophysis.

The anterior flap is formed by the rest of the clavicular portion of the deltoid by the pectoralis major, the coracoid part of the biceps, the coraco brachialis, part of the triceps, the nerves and axillary vessels.

If we desire to remove the right arm, cutting with our right hand, instead of beginning the operation by

the posterior part, we enter the joint by the anterior region, reversing the movements before described.

We may still perform the operation on this arm in the same manner as upon the other, by using the knife with the left hand. The surgeon is placed behind the patient, and makes his posterior flap according to the principles laid down above. The internal flap is made according to the same principles. It is also easy to attack the right shoulder joint from its posterior part, with the right hand. After making the posterior flap, as when we operate on the left arm, the surgeon passes rapidly to the inside of the limb, to make the inner flap.

According to the excellent observations of Mr. Professor Serres on the laws of Osteogeny, it results that the summit of the acromion remains cartilaginous until the age of fourteen or fifteen years, and often beyond that time; the length of this cartilage is such, that it covers the head of the humerus, and the ossified points of this process do not advance but a line or two over the superior extremity of the arm bone; the scapular extremity of the clavicle also remains cartilaginous, but to a less extent. When, therefore, we have so young a patient, and until this age we may dispense with the introduction of the knife between the acromion and the head of the humerus, and perform the operation, as LISFRANC has also explained.

Whatever may be the attitude of the arm, says he, I apply the heel of the amputating knife on the outside of the summit of the coracoid apophysis, direct it downwards and backwards, and after having carried it for the space of two inches, I conduct it by ascending towards the hollow of the axilla, whose superior border it divides at the point which would intersect a line passing from the centre of the joint, and forming an angle of  $40^{\circ}$  with the axis of the shoulder. Thus we form a

flap, which is to be raised up, of two-thirds of the deltoid, of a part of the teres major and minor, the latissimus dorsi, and the long head of the triceps. In the second period of the operation, whether the capsule has been opened or not, it is very easy to traverse the joint directly. To do this, we boldly cut the acromion and clavicular cartilages, and enter the articulation. We make the internal flap as when we operate on the adult.

After having tied the arteries and cleansed the wound, we place some rolls of lint at the bottom of it, and we bring the flaps together in such a manner as to keep them in this situation with adhesive straps, and somewhat long compresses, and sustain the whole by aid of a large bandage moderately tightened. We never attempt to produce immediate union.\*

\* If we reflect on the extent of the wound produced by this operation, and the nature of some of the parts divided, we shall feel much inclined to protest against keeping it open by thrusting lint to the bottom of the cavity, although it may be well to wait until reaction has commenced over the cut surfaces, to determine whether more arteries may not require the ligature. The irritation produced by the mere division of the large brachial plexus of nerves is always great, and sometimes fatal, when the patient has been brought very low by disease; certainly this irritation will not be diminished by the treatment above directed, and most certainly, after all the arteries are secured, nothing can be a better dressing to the wounded surface than the living flaps, with which adhesion may to a very great degree immediately take place. With balls of lint in the cavity of the wound, having the flaps brought together and retained over these by adhesive straps, compresses, and a moderately tight bandage, we could hardly anticipate a very favourable result, though it must be confessed that the human body occasionally survives the most desperate injuries, apparently under the most unfavourable circumstances.— J. D. G.

*Partial amputation of the lower jaw.*

This operation has been practised with success by DUPUYTREN, at the Hotel Dieu of Paris.\* The cases demanding it are those of exostosis, necrosis, caries, and cancer of the bone.

The mode of operating undergoes some variations, according to the extent of the bone we wish to remove. Let us suppose the most ordinary case, which consists in the amputation of the chin; the following is the mode of performing it.

The patient is seated on a chair, and the head strongly fixed backwards against the chest of an assistant, who seizes one of the sides of the lower lip between his fore finger and thumb, while the surgeon lays hold of the other in the same manner, with his left hand. Then holding, in the third position, in his other hand, a bistoury with a convex edge, he makes an incision, which departing from the middle of the free border of the lip, terminates directly at the middle of the os hyoides. If only a small portion of the bone is to be removed, this incision will suffice; but if the diseased portion be of more considerable extent, we make a second incision transversely upon the first in front of the middle of the chin. We then detach the adhesions of the soft parts to the bones, by dissecting from above downwards, perpendicularly to the axis of the trunk, till we arrive at the part which is to be cut off. We dissect in the same manner on the opposite side, and denude the bone of its periosteum at the point where the saw is to be applied. When we have made a crucial incision, it is dissected as indicated at page 12.

If there be any teeth in the way of the saw they

\* In the United States it has been performed successfully by Professor Mott of New York, and with partial success by other persons elsewhere.



should be drawn; then the operator taking a small saw in his right hand, applies it to the bone at the base of one of the flaps, and saws obliquely from without inwards, while the assistant keeps the bone firmly fixed. He saws in the same manner on the opposite side. To avoid injuring the nose and upper lip, a piece of lead or a linen compress is placed over these parts. Having finished the section of the bone, the surgeon glides the edge of the bistoury behind the posterior surface of the amputated fragment; then makes a division of the soft parts, which are adherent by a single cut along the edge of this part of the bone. To stop the hemorrhage, the tongue is raised and drawn forward, in order that the arteries may be laid hold of by the forceps. They are to be tied; and should the blood continue to flow without our being able to perceive the arteries which furnish it, we employ the actual cautery at a white heat.

The surgeon then brings the two ends of the bone towards each other, and next places the flaps in immediate contact, retaining them as in the operation for harelip, by commencing from the loose edge. When the skin participates in the disease rendering the operation necessary, the diseased portion should be circumscribed by two incisions, and removed along with the bone. In this case, as the union of the edges of the wound become more difficult, on account of their reciprocal distance, we ought to dissect them from the bone and gums, when they may be brought together without difficulty.

*Partial amputation of the toes at their metatarso-phalangeal articulation.*

It is better to extirpate the whole toe, even when amputation of a single phalanx would suffice, to remedy the accident or the disease, because the stump left is more inconvenient than useful.

The same principles which govern us in removing the fingers at their metacarpo-phalangeal articulation, are to be followed in amputations of the toes; the only difference is, that we ought to begin the incision with the point of the bistoury, instead of the full edge, and the cut should be directed parallel to the bone, until we arrive opposite the articulation, which is much deeper seated; we then glide the point of the bistoury between the two articular surfaces, partly circumscribe that of the phalanx we wish to detach, and finish as has been directed in removing the fingers. (See page 47.)

### *Amputation of all the toes.*

This is done according to the same principles with the amputation of all the fingers, with this single difference, that the great toe is comprised in this amputation, while in that of all the fingers, the thumb is not. If we operate on young patients, about until the age of puberty, as the metatarsal extremities are still cartilaginous, in such cases, we follow the principles indicated for the amputation of all the fingers. It is on the laws of osteogeny, established by Professor SERRES, that LISFRANC has based his operation, until the time of life mentioned above.

### *Amputation of the first and fifth metatarsals, cutting through the bones.*

This operation is principally performed, on account of caries of the bone. When we can be certain of the extent of the disease. The following is LISFRANC's method; supposing the first metatarsal of the left foot is to be removed.

*First method.*—Placing the foot on a table, and having it secured by an assistant, the operator grasps the integuments and muscles situated on the inner side of the bone, and presses them as far downwards as possible, to make a flap of proper thickness. Then he plunges the point of the bistoury, held in the third position, perpendicularly from above downwards, between the inner side of the bone and the soft parts, which he holds with his left hand, immediately behind the diseased point; he cuts a flap in the length of this bone, by directing his incision towards the toe, to come out a little beyond the articulation of the first phalanx, with the metatarsal bone. From the base of this flap, which an assistant raises up, he commences another incision, which crosses the bone, somewhat obliquely outwards, on its superior surface, and which ends on the inner and upper side of the metatarso-phalangeal articulation. We may, however, without making this second incision, dissect the skin from the base of the flap to the articulation indicated, and have it drawn outwards by an assistant. After this, the surgeon carries the edge of the bistoury between the two metatarsals, some lines in front of the base of the flap, introducing the point by the upper and outside of the first of these two bones, to come out obliquely on the external and plantar side, without interfering with the skin of either surface; thence he cuts directly down to the union of the toes, where his knife comes out. He then denudes the bone circularly and obliquely from the internal basis of the flap, to some lines in front of this flap, on the upper and inner side of the bone, which is the most difficult part of the operation. Nevertheless, it may be performed without difficulty, by introducing the blade of a very narrow bistoury flatwise, between the two metatarsals, and then turning the blade towards the point of bone we wish to lay bare, to cut the soft parts alternately from above downwards, which ad-

here thereto. The bistoury is withdrawn to denude the bone on its free edge; we then place a piece of sheet lead between the two bones. A small saw held in the right hand, is applied to the bone at the base of the flap, and we saw obliquely from behind forward, and from the internal to the external edge, in the direction it has been denuded. The obliquity should be proportioned to the thickness of the bone.

If necessary, we tie the arteries, and unite the wound by the first intention, maintaining the edges in contact with adhesive straps.

*Second method.*—The surgeon makes an incision over the middle of the bone, on its dorsal surface, immediately behind the diseased part; he directs it obliquely towards the inside, and continues it to the lower and inner side, somewhat in front of the metatarso-phalangeal articulation; a second incision, departing from the same point, is directed obliquely towards the opposite side, to join the first at the plantar surface. These two incisions thus circumscribing a flap on the dorsal face of the metatarsus. We then dissect as in the first method; denude the bone obliquely from behind forwards, and finish the rest of the operation exactly as has been above stated.

The same principles are all applicable to the amputation of the fifth metatarsal; only the denudation and section of the bone should be somewhat less oblique, on account of the diameter being smaller.

*Partial amputation of the foot at its tarso-metatarsal articulation.*

[LISFRANC'S METHOD.]

The patient lying on a bed, or placed in a chair, we apply a tourniquet over the femoral artery, or else have

it compressed by an assistant: another assistant secures the foot firmly in its natural position. Suppose the operation to be performed on the right foot: the surgeon traces with the fore finger of the left hand, along the outside of the metatarsal, until he arrives at the tuberosity, where this bone is articulated with the os cuboides. He places the thumb of this hand on the tuberosity; he then carries the fore finger of the right hand along the internal edge of the first metatarsal, and traces the bone until he arrives over its tarso-metatarsal articulation; if he cannot by this mode distinguish this articulation, he draws an imaginary line from the tuberosity on which his thumb is applied, supposing it to be directed transversely over the dorsal surface, and perpendicular to the axis of the foot; it is at a half an inch in front of this line, that the articulation of the first metatarsal, with the internal cuneiform bone is found. The surgeon places his left fore finger over this point, keeping the thumb fixed on the opposite tuberosity. Then grasping a narrow, short and keen knife in his right hand, he makes a semilunar incision on the back of the foot, with its convexity anteriorly, by commencing near his thumb, and continuing it towards his fore finger, which is only removed to make way for the edge of the knife. An assistant draws the skin towards the leg. Then grasping the foot with the whole hand, as if to dislocate it, the surgeon cuts with the point of the knife, the ligaments which connect the fifth metatarsal with the cuboides: he enters the articulation of these two bones, with the edge of the knife, from the outer side of the foot, giving to the edge the direction of a line, which would terminate on the outer side of this articulation, at the anterior extremity of the first metatarsal. Having then cut the ligaments which unite the two succeeding metatarsal bones to the cuboides, by giving the knife a less oblique direction, he carries the instrument perpen-

dicularly over the inner side: the point being directed upwards, opens the tarso-metatarsal joint of the first metatarsal, by cutting in the direction of a line, which departing from the inside of this articulation, passes over the middle of the fifth metatarsal bone. Changing the direction of the instrument, the back of which he turns towards his chest, he plunges the point from above downwards, between the projection of the internal cuneiform and the second metatarsal bone; then by a somewhat considerable effort, he raises the handle of the knife, which describes an arc of a circle, to cut the interarticular ligaments, which unite the two bones. With the point of the knife, he then cuts the ligament which unites superiorly the head of the second metatarsal to the second cuneiform. He then luxates the foot forcibly to open the articulations, and he cuts the interarticular ligaments, by carrying the point of the knife several times into the opening. When the articulation is completely open, he glides the knife between the inferior face of the metatarsal bones and adhering soft parts, directing its edge towards the toes, and shapes a flap of such a size as will reach to the superior edge of the wound.

If the left foot be operated on, we commence the first incision on the inside.

If we operate on a young subject, before the age of puberty, as the projection of the internal cuneiform is still cartilaginous, as *SERRES* has observed, *LISFRANC* proposes to traverse this point with the edge of the knife, nearly on the same line on which the articulations of the second, third and fourth metatarsals are found. This will be the more easily effected in proportion to the youth of the subject.

The arteries are to be tied and the wound healed by the first intention: leaving a pledget of lint in the external and inferior angle of the wound, to facilitate the escape of pus, should adhesion not take place.



*Partial amputation of the foot at the articulation of the astragalus and os calcis, with the Scaphoid and Cuboid bones.*

This operation is named after CHOPART, who passes for the first who performed it. LISFRANC, in his lectures, directs it to be done in the following manner.

The foot being placed in its natural situation, on the edge of a bed or table, and secured by an assistant, we seek for the articulation. To do this, supposing the right foot to be operated on, the surgeon traces with the fore finger of the right hand, from the malleolus internus until it encounters the projection formed by the scaphoides on the inner side of the foot, and there the joint is found.

The articulation of the cuboides with the os calcis towards the outside, is constantly found about half an inch behind the projection formed by the posterior and external extremity of the fifth metatarsal bone. These two points being fixed, one by the thumb and the other by the index finger of the left hand, while the sole of the foot is strongly seized by the palm of that hand and the other fingers, the operator makes an anteriorly convex semilunar incision with a narrow bladed knife, beginning at the point where his thumb is held, and ending at the fore finger, which should only be removed to make way for the edge of the knife. He enters the astragalo-scaphoid joint, directing the edge obliquely in the course of a line which drawn from the inner side of this articulation would fall upon the cuboid extremity of the fifth metatarsal. He luxates the foot to open the articulation, cuts the dorsal ligaments with the point of the instrument, enters transversely from without inwards into the calcaneo cuboid articulation, repeats the luxation, cuts with the point of the instrument the strong interarticular ligament, and the joint being

widely open, he passes the whole blade of the knife between the inferior face of the scaphoid and cuboid bones and adherent soft parts, and cuts from behind forwards, a flap capable of covering all the wound, by avoiding the tuberosities of the scaphoides and cuboides, and of the first and third metatarsals, and by restoring the foot to its natural position.

The arteries are taken up, and the edges of the wound immediately brought together by adhesive straps, leaving a pledget of lint in the inferior angle of the wound, &c. as heretofore indicated.

### *Amputation of the leg with a single flap.*

This operation is never performed except towards the superior part of the lower third of the leg.

The patient lying supine on the side of a bed or table, and the leg supported by two assistants, the femoral artery is compressed with a tourniquet or by the hand of another assistant. The surgeon, seated on the inside of the limb, seizes the leg with the left hand, placing the thumb on the internal edge of the tibia and the fore finger on the fibula; then with a catlin knife held in the right hand, he makes a transverse incision on the anterior face of the leg which parting from his fore finger is continued until it arrives at the left thumb fixed as has been described; then introducing the point of the knife by the internal angle of the incision, and bringing it out at the opposite angle by ~~shaving~~ the posterior face of the tibia and fibula, he ~~cuts~~ a flap proportioned to the thickness of the limb, and directs the knife towards the lower extremity along the bones. An assistant raises the flap. The surgeon applies the edge of the knife over the posterior and external face of the fibula, cuts the remaining soft parts until the point of the instrument reaches the

interosseous space, which he enters and divides the soft parts there situated. The knife is then disengaged from between the bones passed over the tibia, denudes it of its periosteum, re-enters the interosseous space, and is used as before; the instrument is then withdrawn and finishes the denudation of the posterior part of the tibia. When these bones are fairly denuded, we pass the central tail of a retractor between the bones and draw the soft parts out of the way of the saw: this latter instrument is grasped in the right hand; it is applied on the fibula and tibia on the outside of the leg as high as the base of the flap, and the sawing is conducted so as to finish the division of the fibula before that of the tibia, by employing the saw according to the principles heretofore established. The anterior and posterior tibial, and the peroneal arteries are tied; the flap is brought over the bones, and healed by the first intention; the ends of the ligatures depend from the posterior angle of the wound, and lint is also left within it, for the purposes already specified.

*Circular amputation of the leg, four inches below the articulation of the knee.*

Every thing being arranged as in the preceding case, the surgeon armed with a catlin knife, first makes a circular incision to cut the skin, a second to cut the muscles, and a third to cut the deep layers, according to the principles heretofore laid down, for the circular amputation of the fore-arm and arm. The remainder of the operation is entirely similar. This operation should leave a stump of about four inches, for the application of an artificial leg.

The arteries being secured, the edges of the wound are brought together so as to form an anterior and pos-

terior angle; in the latter we place the pledget of lint, and the ends of the ligatures are brought out through it.

*Amputation for the removal of the knee joint.*

Although we are persuaded that this operation is in every case more dangerous than that of the amputation of the thigh, and that of consequence the latter should always be preferred, we shall nevertheless describe the former operation.

The patient lies supine on a bed or table, so that the thigh projects somewhat beyond the edge; the femoral artery is compressed, and the surgeon flexes the leg on the thigh almost at right angles, and makes with an amputating knife a deep incision, so as to enter the articulation by cutting from one condyle of the femur to the other, below the point of the patella. Then the crucial ligaments are cut with the point of the instrument, avoiding the popliteal artery. A second section is then made by departing from one of the angles, and terminating at the angle opposite the first incision, but passing above the patella. The leg is now more strongly flexed on the thigh, and an incision made around the femur, immediately above its condyles; the bone is entirely denuded at this point, carefully avoiding the artery, and sawing transversely.

The lower extremity of the femur and patella being thus removed, the superior extremity of the tibia ought to be accurately denuded somewhat below its articular surface, by making at several strokes a circular incision around this part. We then saw it transversely at the line exposed, taking care to avoid the popliteal artery. We then straighten the leg to bring the sawed surface into contact, and apply splints as in the case of fractures, keeping the whole limb extended. We think

that there is something more than temerity in undertaking this operation, under any circumstances.\*

*Amputation of the thigh with two flaps.*

The patient is commonly seated on the edge of a table, with his back supported against a mattress or bolster; the tourniquet is applied as high up as possible over the course of the femoral artery, or an assistant compresses it against the pubis, and another assistant sustains the leg. The operator, being on the outside of the limb, and armed with a large knife, first makes the internal flap, by plunging its point from the middle of the anterior to the posterior face of the thigh, grasing the inner side of the thigh bone. He shapes a flap of two or three inches by directing the incision towards the knee joint. He then forms the second flap on the opposite side, by introducing the instrument from the same point he commenced the first, and grasing the outer side of the bone, comes out below at the same point where the first incision ended; he then cuts out a flap in the same direction and of equal length as that on the inside. The two flaps being raised by an assistant, a circular incision is made at their bases to finish the division of the muscular fibres adhering to the bone, which he denudes near this point. Then taking the saw in the right hand, he places the thumb nail on the bone to direct the first movements of the instrument, he saws the bone trans-

\* Mr. Park, in England, was the first who cut out the knee joint with success, and to remove the ends of the bones advantageously, he devised a jointed saw, constructed on the principle of a watch chain. The operations he performed in this way were difficult of execution, and the patients were long in recovering: the risk is so great, that few surgeons will feel themselves at liberty to recommend or repeat this operation.

J. G. G.

versely, while an assistant carefully raises the flaps. The arteries are tied, and the wound healed by the first intention, the flaps being held together by adhesive straps and a roller bandage. The pledget of lint in the inferior angle, &c.\*

### *Circular amputation of the thigh.*

Every thing is arranged as in the former operation; the surgeon is placed on the outside of the limb, kneel-

\* A mode of amputating the thigh with two flaps was proposed a few years since by Professor J. B. DAVIDGE of Maryland, which combines several important advantages. The first incision is made with the large knife on the outside and inside of the limb through the integument, so as to surround the limb, with the exception of an inch or more in the centre, above and below. The surgeon having calculated the size of the flaps required, which are to be as long as the semi-diameter of the limb, makes with a scalpel a second and third incision through the skin, in form of the letter V, commencing in the centre of the space left vacant on the superior and inferior surface, and continued till its diverging extremities reach the ends of the semicircular cuts first mentioned. The flaps of integument are then dissected back until they equal in length a little more than the semi-diameter of the limb, to allow for the retraction that may occur. A circular incision is then made with the large knife, through the muscles down to the bone. The bone is then denuded for an inch or two, the retractor employed, and the bone sawed off at the edge of the divided flesh. The arteries are then secured; the muscles drawn down; the ligatures arranged so as to come out of the superior and inferior angles of the wound, and the flaps are brought together and kept in place by adhesive straps supported by a cross bandage, roller, &c. By this amputation the bone is cut off, an inch or more within the actual face of the stump, and the flaps of integument, having the angle cut out above and below, do not present that unnecessary and inconvenient lump or puckering formed at the angles after the common circular amputation. I have seen this operation frequently performed by my preceptor THOMAS H. WRIGHT, M. D. with great skill and success.



ing on the right knee, and makes a circular incision around the thigh in the same manner as has been described in the amputation of the arm. He dissects the skin for the space of about two or three inches, and one of the assistants turns it upwards. A second circular incision is made down to the bone, and a third obliquely over the remaining muscular fibres adhering to the bone; the surgeon takes the saw in his right hand, applies it on the denuded bone towards the base of the flap, and saws transversely, guiding the first strokes of the saw with his left thumb.

After tying the arteries, we bring the edges of the flap together so as to form an anterior and posterior angle, keeping the edges in contact with adhesive straps and a rolled bandage. The pledget of lint is placed in the posterior angle, &c.

### *Amputation of the thigh at the hip joint.*

#### [LISFRANC'S METHOD.]

Without attempting to describe the different methods which have been devised for the performance of this operation, we shall only give that of LISFRANC, which exceeds all those hitherto proposed, by the promptness with which it may be performed, an advantage so much the more excellent, as the amputation of the thigh is not only exposed to considerable hemorrhage, but causes dreadful suffering in proportion as it is prolonged.

Let us suppose that the left thigh is to be operated on.

*First period.* The ischiatic tuberosities of the patient extend slightly beyond the inclined plane upon which he lies supine. The right hand of the surgeon held in pronation, directs the instrument. An assistant keeps the limb extended, and in a state between abduction and adduction, if possible. The surgeon stations himself on the outside, and a little below the joint; he plunges a

long, narrow and thick bladed catlin knife, perpendicularly, into the internal extremity of a line, making a right angle with one which descends from the anterior superior spine of the ilium; the inferior edge of the knife ought to be in the direction of a line which commencing at the first puncture, could be continued to the top of the greater trochanter. The point of the instrument penetrates to the head of the femur, whose external face it goes round; but it is *indispensable* that in proportion, as it is pushed deeper, the handle of the knife should be lowered, so as to be inclined outwards and upwards, forming with the horizon and the axis of the trunk an angle of from  $50^{\circ}$  to  $55^{\circ}$ ; the instrument comes out some lines below the ischiatic tuberosity, where the eyes of the operator precede it. In order that the textures of the posterior region of the thigh may be more easily divided by the knife, an assistant or the surgeon grasps them, and makes them project on the outside. At the moment when the puncture is made, the knife always forming the angle mentioned above, with the horizon, its inferior edge following then the direction of the line in which it was placed, descends, passes round the great trochanter, rather sawing than pressing, runs along the femur for the space of about two inches, and terminates the external flap.

At the moment this flap is made, it is raised up, the assistants apply their fingers on all the arteries which pour out blood; they are secured immediately before proceeding to the formation of the second flap.

*Second period.* The surgeon, after having pressed the soft parts inwards, with his left hand, plunges the point of the knife below the head of the femur, on the inside of its neck, one of the edges is directed upwards, the other downwards; but we should take great care, that the instrument inclined over the belly, forms with the horizon an angle of about  $60^{\circ}$ . The knife passes

round the bone, and comes out without touching the pelvis at the posterior and superior angle of the wound. The instrument then becomes perpendicular to the horizon, is carried along the femur, for the extent of about two inches, and avoids the lesser trochanter, by pressing the knife slightly inwards; finally, the internal flap is finished, by dividing the textures, so as to have them sloping inwards. This flap equals the external in length. We must not omit to mention that an assistant should introduce his fingers deep into the wound, as soon as the soft parts detached from the femur will permit, and that then the thumb of the same hand being applied to the skin, which covers the superior and internal surface of the thigh; this assistant compresses the crural and deep arteries before they are opened.

The arteries being all secured, the assistants keep the flaps raised up.

*Third period.* The surgeon grasps the femur with the left hand, if the bone be sufficiently long,\* and carries the edge of the knife perpendicularly upon the inner side of the head of the bone, which he circumscribes as much as possible. To divide the capsule and some other soft parts, not cut in the formation of the flaps, he should not seek to penetrate the joint in proportion as it is exposed, but, he should cut upon the capsular ligament, as if he wished to leave half the head of the femur in the cotyloid cavity. Then the joint is sufficiently opened for him to cut the triangular ligament, with the point of the knife, on the head of the bone. Finally, the instrument, whose point is perpendicular to the horizon, is moved to the inside, cuts from within outwards, the remains of the capsule and some muscular substance,

\* Supposing the lower part of the bone to have been carried away by a cannon shot or some other accident.

which in cases where the thigh is large, could not previously be divided.

If we operate on the right thigh, the left hand ought to be used; but the knife may, even in this case, be guided by the right hand, though then it will be indispensable that the surgeon should be placed against the trunk of the body, on the side of the joint to be operated on.

We do not attempt to produce union by the first intention, but we should, as Professor BOYER advises, after amputations in general, during some days only, place lint in the wound, to reunite it, when the granulations are well developed.\* We moreover, apply adhesive straps and a bandage very analogous to the spica (or spiral roller) bandage of the groin. In case of inflammation, the application of ice should not be neglected.

\* We have already expressed an opinion as to the impropriety of keeping large wounds open by the introduction of lint, &c. without apparent reason. If the arteries be all secured, nothing but irritation and inflammation can be produced by such treatment; and we would venture once more to suggest, as a general rule, that union by the first intention, should be attempted after all operations, similar to those heretofore described.

The operation at the hip joint has been performed frequently with success, and most recently by Mr. SIMS of Edinburgh. In cases where the thigh has been carried off by a cannon shot, and the system has begun to react sufficiently, the necessity of the operation is evident; but it is by no means easy to decide as to the propriety of performing such an operation on patients having disease about the hip joint and head of the femur. Certainly, in many such cases, if the irritation of the disease could be removed, the constitutional powers would become more vigorous and healthy; but unfortunately, the removal of the disease requires an operation, which, under such circumstances, generally hastens the patient's death.—J. D. G.

## AMPUTATION, EXCISION, SECTION, AND EXTIRPATION OF SOFT PARTS.

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### *Amputation of the breast.*

We read in the history of the principal operations of surgery, that Leonidas of Alexandria, was the first who operated for cancer of the breast. His method was as follows:—the patient lying supine, he made a first incision through the integuments over the tumor, then immediately applied the actual cautery to stop the hemorrhage: he made a second deeper incision, and again applied the cautery, and thus in succession, until he had entirely destroyed the whole breast. Finally, he terminated the operation, by cauterizing the whole surface of the wound, to destroy all the remaining cancerous points. This barbarous and cruel process deserved the rejection it has received.

In the cases which demand extirpation of the breast, we must not forget that the skin which adheres to the tumor, and the cellular texture which surrounds, ought to be removed with it, for the extent of at least half an inch into the sound parts. We need not hope for a cure, if this precaution be neglected.

The patient is seated in a chair, the head supported against the breast of an assistant;\* another assistant

\* The propriety of this position, is extremely questionable, not only because few assistants can be found to support the patient with sufficient steadiness, during so tedious an operation as this very generally proves, but because the patient is rarely,

raises the arm of the diseased side, in order to render the great pectoral muscle tense. The surgeon places himself in front of the patient, but a little to one side, and disposing the fingers of the left hand, in a line to stretch the skin on the outside, he makes, with a convex bistoury, a semilunar incision obliquely from below upwards, on the outside of the tumor. He then makes a second incision on the inside, which commences and finishes at the same point as the first; the integuments are then stretched towards the sternum, with the radial edge of the left hand. The axis of the ellipsis, resulting from these two incisions, should form with the axis of the body an angle of about  $45^{\circ}$ , the apex of which is below, and the base upwards, to facilitate the flow of pus. LISFRANC advises to dissect from below upwards, commencing on the outside, and in the direction of the fibres of the great pectoral muscle, so as not to detach its inferior edge, which would lay bare the ribs. If the dissection is made from above downwards, the blood will hide the parts over which the edge of the bistoury is to pass, an inconvenience, which does not occur when we dissect as first above directed.

The assistants arrest the bleeding by applying their fingers over the orifices which furnish the blood.

When there is a chain of cancerous glands extending from the bosom into the axilla, we circumscribe the breast and glands by the same incision, but if there be an interruption between the diseased glands and breast, we extirpate them by making an incision separate from

or never in a condition to remain in this position, while the operation is going on, without a great disposition to syncope. We have seen this operation performed frequently, and on a considerable variety of patients, and never yet met with one capable of sitting thus, to be operated on. The recumbent position is preferable.—J. D. G.



the first. When the diseased gland is exposed, we lay hold of it with a double hook, draw it upwards to dissect under it and secure the vessels, which are to be tied as they are opened, lest they should retract too far, and cannot then be tied; if they be of considerable size, we tie them before they are divided.

It may be, that the ribs participate in the cancerous disease; in this case we expose them, and apply the actual cautery to the diseased parts.\*

The arteries are tied, and an hour or two after the operation the edges of the wound are brought together, and healed by the first intention; the ends of the ligatures are brought out at the inferior angle of the wound. Long adhesive straps keep the parts in contact; pledgets of lint, compresses and a body bandage, sustained by means of a scapular, complete the dressing.

The same operation is performed when a voluminous tumor is to be extirpated, or a cyst of rather considerable size; but in such a case the crucial incision is to be preferred: it is only when we are not obliged to sacrifice any part of the skin, at least when we do not see beforehand that more than enough skin will remain after the operation to cover the wound, as would be the case in large tumors with small bases, if instead of circumscribing the pedicle by an elliptic incision we made a crucial incision which would uselessly preserve all the skin of the tumor.

### *Extirpation of the eyes.*

Cancerous degeneration of the eyeball, imperiously demands that operation which BARTISCH, a surgeon ocu-

\* Professor Richerand of Paris has even removed considerable portions of the ribs themselves in one case of cancer.

list of Germany, first described. In performing it he employed a curved instrument with two cutting edges which he introduced beneath the upper lid to the bottom of the orbit, and removed the eyeball, after having circularly cut its adherences.

If we wish to extirpate the eyeball, without removing the lids, it is done in the following manner:

The patient lies supine, with the head somewhat elevated by means of a pillow; or rather he is seated on a chair reclining his head against the breast of an assistant. The surgeon places himself in front, if the patient be seated, or on the side of the diseased eye, if he be lying down. He draws the integuments outwards, by placing the thumb and index finger of the left hand upon the external angle of the lids; with the right hand he introduces flat and horizontally a straight bistoury, held in the fourth position, below this angle, and pushes it from within outwards to carry it along underneath the integuments; when the instrument has thus traversed the space of about half an inch, he turns the edge to the front, or rather upwards, if the patient be lying down, makes the point project through the skin, and cuts all that is placed between the heel and point of the bistoury. He then seizes the eyeball with a simple hook, which he fastens with his right hand into the transparent cornea; then, taking the handle of the hook in the left hand, he draws the globe of the eye gently forward. He then holds the bistoury in the first position with his right hand, and plunges it between the ball of the eye and the walls of the orbit perpendicularly to the axis of the globe, towards the internal angle and below the upper lid: he then moves it from within outwards making a circular incision around the globe of the eye; and constantly holding the bistoury in the same position, he finishes where he began: An assistant alternately elevates the superior and depresses the inferior lid, in proportion as

the instrument passes under one or the other. In this way the muscles belonging to the globe of the eye are cut, and there are no other adhesions to the orbit except the optic nerve and the cellular texture, which the surgeon cuts with the scissors curved on the flat side, continuing to draw the globe of the eye forward.\* The fore finger of the left hand is introduced into the upper and outer part of the orbit to seek for the lachrymal gland; we seize it with the hook, and draw it as far outwards as possible, to cut it off with the curved scissors. All the soft parts within the orbit affected with the cancerous disease are removed, otherwise it will soon reappear and continue its ravages. It is scarcely necessary to warn the surgeon to be careful in guiding the point of the bistoury within the cavity of the orbit lest he should thrust it through the bones which form its walls.

When the eyelids are involved in the disease which requires the extirpation of the eye, we remove them with this organ at one and the same operation. For this purpose we pass the point of the hook from above downwards through the free edge of the upper and lower lid, at the same time including a part of the eyeball. We raise the whole together and plunge the bistoury above the upper lid between the walls of the orbit and the eyeball, perpendicular to its axis. We finish the incision as in the preceding case, and take the same precautions relative to the lachrymal gland, and the fatty cellular texture which is contained in the orbit.

To arrest hemorrhage we are careful not to use the

\* For dividing the nerve a keen edged curved knife is certainly the best; scissors always pinch as well as cut, thus giving more pain. No one should trust himself to use much force in drawing the eyeball forwards, when all adhesions, except the nerve, are cut.—J. D. G.

actual cautery, as practised by certain surgeons; we confine ourselves to plugging with lint, and should this be insufficient we sprinkle it with powder of rosin. Over this lint we apply a soft compress, which is retained by a proper bandage.

### *Artificial eye.*

The globe of the eye should at least be diminished one-third to allow it to receive an eye of enamel intended to palliate the deformity which results from the loss of the natural eye. If we apply such an eye, after having evacuated the eyeball, or performed any other operation, it must not be until after the complete cicatrization of the stump and neighbouring parts, the following is the mode of placing it.

We take the eye of enamel by its two edges with the thumb and fore finger of the right hand, having the cornea in front, we dip it in fresh water and pass it under the upper lid, which is raised by the fingers of the left hand; this lid is abandoned and the inferior lid lowered until the edge of the artificial eye comes within. The lids return to their natural state and retain the eye in its position. It must be carefully removed every evening and placed in a glass of fresh water; by so doing ulceration of the lids is prevented, and the enamel retains its polish for a longer time.

To remove it, we depress the inferior lid, and we insinuate between it and the edge of the artificial eye, the head of a very well polished pin, with which we draw it forwards.

If the globe of the eye has not been completely removed, and a stump remains, the motions of the stump will communicate to the artificial eye, movements so

much in harmony with those of the sound eye, that the illusion is perfect.

Persons who use artificial eyes, would do well to have several at their disposal.

### *Excision of a Pterygium.*

Authors advise us to pass a thread through the nebulous pelicle, known by the name of pterygium, and which commonly extends between the cornea and lachrymal caruncle, for the purpose of cutting it off: by others the nitrate of silver or other caustic is recommended for its destruction. SCARPA advises, that instead of traversing it by a needle and thread, for the purpose of raising and cutting it off, we should lay hold of the varicose spot with forceps, and remove it by the flat curved scissors. LISFRANC, following SCARPA's method in part, proposes to excise the pterygium in the following manner:—

The patient being seated on a chair, in front of a window, and the head supported against the breast of an assistant, who raises the upper eyelid at the same time with the end of the index finger, the surgeon seizes the pterygium with very small forceps, and draws it forward with the left hand; an assistant taking hold of it at another point, draws it equally outwards: in this way it is detached from the eye; and if it be not sufficiently so, another assistant takes hold, with a third pair of forceps, and raises it. Then the operator, having a pair of very delicate scissors, curved on their flat side, cuts off the varicose substance, thus raised up. During the operation, the eye is kept turned outwards, in order to facilitate it. We wash it with cool water, and the operation is ended. It is striking, simple, and slightly painful.

*Excision of the Lips.*

When any more or less extensive part of the upper or lower, but much more frequently the lower lip, is affected by a cancerous degeneration, it is customary to destroy the diseased part, by the reiterated application of the actual cantery: DUPUYTREN performs in such cases, the excision of the parts affected by cutting into the sound parts.

The patient is seated in a chair, the head being fixed against the chest of an assistant. The surgeon seizes the diseased lip with the thumb and fore finger of the left hand, draws it forward, while with a straight bistoury, held in the right hand, in the third position, he cuts boldly behind the diseased part, removing all the cancerous and a small portion of the sound part of the lip. He then takes up the arteries. The edges of the wound are shielded from the contact of the air, by covering them with a slight compress and some lint; the whole being sustained by an appropriate bandage.

Experience proves that the texture of the lip is reproduced to a sufficiently great extent, again to cover the teeth. LISFRANC relates in his lectures, a case, in which DUPUYTREN having removed all the lower lip, and even a great part of the integument which covers the skin, the edges of the wound grew up above the level of the necks of the teeth, so that the deformity was not very considerable.

*Excision of the Tonsils.*

During a long time the tonsils were destroyed, by the actual or potential cautery, in cases requiring extirpation; at the present day, excision is preferred.



The patient is seated in a chair, opposite a window, reclining his head against the breast of an assistant. The surgeon, placed in front, causes him to open his mouth widely; and if the patient is untractable, he places a piece of cork within each angle of the jaws: an assistant retains them with his fingers, for fear of accident; the tongue is depressed with a spatula. When both tonsils are to be removed, we begin with the left. The surgeon catches it with a double hook, somewhat behind and in front, and holding a probe pointed bistoury in his right hand, like a pen, he passes it into the fauces, and cuts from below upwards, and from right to left, by insensibly changing his hand from a state of supination to semi-pronation, making the instrument thus describe an arc of a circle. When the right tonsil is to be removed, we have the hand pronated, and we change it slowly, to a state between pronation and supination, and by cutting from below upwards, and from left to right. It is not improper to allow it to bleed during a short time. We use acidulous or emollient gargles; and if the hemorrhage is obstinate, we have recourse to astringents.\*

### *Excision of the Uvula.*

The elongation of the uvula, or a schirrus or cancerous condition of it, are the cases demanding its excision. LISFRANC observes, in a memoir upon the functions of this organ, that we have too much neglected this operation in cases of pthisis, and that by destroying the uvula he had frequently cured this affection, against

\* See Dr. PHRISICK's paper on the removal of the tonsils, by a double canula and wire, in vol. 1, p. 17, of Chapman's Journal.

which all known remedies have proved unavailing.\* He thinks, also, that it is a good mode of relieving certain gastrites, because he says that the tickling of the throat produced by the loose and floating extremity of the uvula, often induces irritations of the stomach and the windpipe. He advises the removal of the whole uvula. According to this celebrated surgeon, no inconvenience follows this operation but the trifling one of allowing the nasal mucosity to fall more easily upon the larynx: however, this inconvenience cannot be balanced against those which would result from a second incision.

*Operation.*—The patient is seated in a chair facing a window, with his head leaning backwards against the breast of an assistant; the surgeon, placed in front of him, causes him to open his mouth widely, and if he be timid or intractable, it is to be kept open by placing a piece of cork within each of the angles of the jaw. An assistant retains them with his fingers, lest the patient should eject them by some sudden movement, and expose himself to a serious accident. The tongue is also to be held down with a spatula, if necessary. Then the surgeon carries a pair of perforated polypus forceps into the fauces with the left hand, lays hold of the uvula with sufficient force to prevent its escape, draws it forwards, and to the right side of the mouth: then holding a pair of probe-pointed and flat-curved scissors in the right hand, he introduces them almost transversely into this cavity; the superior part of the uvula is passed be-

\* In this country we have generally considered Dr. PUYSECK as the originator, as he was, certainly, the successful introducer of this practice. We know not the date of LISFRANC's memoir, but we have read in "Sprengel's History of Medicine," that this operation was resorted to by an ancient physician, with nearly similar intentions.—J. D. G.

tween the blades as far as to their joint, and is entirely excised. LISFRANC assures us that this process has always succeeded in his hands.

If the inflammation be considerable, it is not amiss to allow some blood to flow; the hemorrhage will cease spontaneously, and if this does not happen we prescribe some astringent or emollient gargle, according to circumstances.

*Excision of cancerous tumour of the Tongue, or of part of that organ.*

The diseases which demand this operation are cancerous tumours situated upon the tongue; but it is necessary carefully to distinguish between these affections and such as are produced by venereal diseases; for the latter commonly yield to proper antisyphilitic treatment.

If the tumour adhere to the tongue by means of a pedicle, the following method is employed for its removal:

The patient is seated facing a window, with his head supported against the breast of an assistant. The mouth is opened, and if necessary kept so by means of pieces of cork placed between the teeth at the angles of the jaw. The operator, placed in front of the patient, lays hold of the tumour with a double hook, draws it forward, and retains it in that position with the left hand. Then he carries with his right hand the flat curved scissors towards the base of the tumour, and cuts it off as near as possible to the surface of the tongue.

To arrest the hemorrhage and destroy the disease radically, the actual cautery at a white heat, is applied to the wound. If the tumour occupy the point of the tongue, to a certain extent, instead of cutting it off

transversely behind the diseased part as directed by Louis, Mr. BOYER advises us to cut the point of the tongue in the shape of the letter V, having the opening towards the anterior part.

The patient is placed as in the former case. The tongue is to be thrust out, and the surgeon fixes a simple hook into the diseased part. He takes hold at the same time, of the right edge of the tongue with the thumb and fore finger of the left hand, and confides the handle of the hook to an assistant. He then takes a pair of strong straight scissors in his right hand, and cuts, at a single stroke, from before backwards, beyond the diseased part, and makes a second incision similar to the first, between the tumour and the sound part of the left side of the organ. These two incisions unite at a more or less open angle according to the size of the tumour removed.

To effect the union of the edges of the wound, we pass a small needle, bearing a linen or hempen thread, first through the left side and from within outwards through the right, at about a line and a half from the free edge of the tongue, and about an equal distance from the edges of the wound. The two extremities of the thread are tied and given to an assistant, who brings them forward, drawing them very slightly. A second stitch is taken in the same manner towards the middle of the wound; we then bring the edges exactly into contact; tie them together by two simple knots, first the two ends of the thread which were first passed, and then those of the second stitch, if the lips of the wound are not sufficiently close on the lower surface, a single stitch on this side will suffice, to prevent this sort of gaping.

The mere contact of the lips of the wound is commonly sufficient to check the hemorrhage.

At the end of four days or more, we remove the threads, and the cicatrization in general is completed.

If it be impossible to preserve both sides of the tongue, we remove this organ by amputating through the sound part, with a bistoury, or with strong straight scissors. In this case, we seize the tongue with a double hook, draw it strongly out of the mouth, and cut it off boldly, directing the instrument from right to left, and use the actual cautery at a white heat, to stop the bleeding. When both sides of the tongue are affected, and the middle is sound, we remove each of the sides separately, by cutting them off with scissors, obliquely from within outwards, so as to give the extremity something of the proper form. The cautery is then used to check the hemorrhage.

### *Division of the Frænum Linguae.*

Nurses frequently bring children to the surgeon, to have the frænum of the tongue divided, because the child cannot suck, or rather it cannot suck easily.

The surgeon has the child brought facing a window, opens its mouth, or, if he cannot do it otherwise, he holds its nose slightly. While the infant is crying, he raises its tongue with the handle of a grooved director, which he holds by its point, with his left hand, bringing the frænum against the hollow in the middle of the director; then by a single cut with the scissors, he divides the frænum to the necessary distance.

But it also happens that children are sometimes brought to be operated on, who have not the defect of conformation alledged; however, to satisfy the imagination of the mother, or the nurse, we may appear to divide the frænum, by making a great snap with the scissors; after which, the nurse will find that the infant sucks admirably.

It rarely happens that this operation causes a dangerous hemorrhage: however, should it bleed freely, we use the actual cautery to check the hemorrhage.\*

### *Amputation of the Penis.*

The patient is placed on his back, while the surgeon being on the left side of him, takes the penis between the thumb and two first fingers of the left hand, near the point where he wishes to amputate it. An assistant holds it below the same place. The skin should neither be drawn backwards nor forwards: should it be drawn forwards it will be denuded for a more or less considerable extent. If it be drawn backwards, more than enough to cover the stump will be left; this inconvenience however is not so great as the former. Every thing being thus prepared, the surgeon armed with an amputating knife, or a long bistoury, severs the penis, directly from below upwards, at a single stroke, half an inch below the diseased part.

The arteries are to be secured, but as they are all accompanied by a nervous filament, which it is difficult not to comprise in the ligature, would it not be better to use the actual cautery at a white heat? A gum elastic catheter is then introduced, and left in the bladder, and the wound is covered with soft lint, which is secured by a suitable bandage.

When the penis is to be amputated very near to the pubis, it is better to introduce the catheter previous to the operation, because the flow of blood will render its subsequent introduction difficult, by concealing the urethra. In such a case, we circumscribe the penis by two lateral incisions, which join by a superior and an

\* A knitting needle, or any small piece of metal heated in the flame of a lamp or candle, will be sufficient.



inferior angle; we dissect the skin, comprised within these two incisions, and we remove the penis with this skin, by pursuing the course above directed. The same mode of dressing is used, as in the first mentioned case.

### *Circumcision.*

The prepuce may be too long, and consequently inconvenient; it may be so narrow that it cannot be drawn back; in such cases we cut it off.

It is customary to excise a part of the prepuce, by drawing the skin of the penis forward, and to cut off all that is pulled beyond the glans; but this method deprives the penis of integument for a considerable extent, behind the base of the glans. To obviate this inconvenience, Mr. LISFRANC advises us to lay hold of the thickness of the skin at the loose extremity of the prepuce, with several forceps. They are then drawn forwards, while the surgeon embraces this integument with a pair of dressing forceps, between the forceps held by the assistants and the end of the glans; he severs all he wishes to remove, by one cut of the scissors. If there be much bleeding, he applies lint dusted with resin powder.

### *Excision of the Prepuce in case of phymosis.*

When the inflammation causing phymosis, endangers the production of gangrene, this operation must be performed. In such a case, Mr. CULLERIER cuts nothing but the mucous membrane of the prepuce, to enlarge the opening, commencing at its outer edge. But this does not always succeed: we are then directed to introduce flatwise, under the prepuce, the blade of a straight bistoury, whose point is guarded by a little ball of wax,

down to the base of the glans. We then turn the edge of the knife upwards, force the point of the instrument through the skin, and then cut it freely to the edge, from behind forwards, by lowering the handle of the bistoury. Ought we to leave the flap which is formed by this incision? In this case it will form a sort of second head alongside of the gland; to avoid this inconvenience, we lay hold of this appendix with the left hand, and cut it entirely off, near its base. The inconvenience of having the penis deprived of prepuce is not so great as that of having a tubercle alongside of the glans.

### *Reduction of the Paraphymosis.*

We cannot avoid speaking here of the reduction of the prepuce when it is drawn behind the glans, after having treated of the opposite condition.

We strongly compress the glans in the palm of the hand to diminish its volume: this compression should be continued during the space of five, ten, or fifteen minutes; we then endeavour to bring the prepuce over the glans, by compressing it towards its base between the index and ring fingers, while with the middle ones we draw the prepuce forward. By this mode we do not enlarge the base of the glans, as necessarily happens when we attempt to reduce it by compressing it with the fingers from the point to its base, as many persons do, which often renders the reduction impossible. LISFRANC, who teaches this method in his lectures, declares that he has never been embarrassed by such a case.

*Extirpation of the Testicle.*

When all doubt is removed relative to the nature of the disease, and the operation is decided on, it is proper before practising it to make a slight puncture into the tunica vaginalis, through the scrotum. This precaution is necessary to prevent an extremely disagreeable accident, which has happened to some surgeons, who, after beginning the operation, have perceived, by the flow of water or blood, that they were mistaken relative to the nature of the disease, which was hydrocele or hematocele. The mode of operation is as follows.

The patient reclines on the edge of the table or bed, with his back supported by a pillow: two assistants slightly separate the thighs. The hairs are then shaved off. The surgeon holding a convex bladed bistoury in the third position, begins his incision towards the abdominal ring, and directs it perpendicularly in front of the testicle, down to its lower extremity; but before commencing the incision he raises the skin so as to form a transverse fold before the cord, at the height of the abdominal ring, by seizing it on one side with the fingers of the left hand, and an assistant raising the skin on the opposite side. If the skin be diseased it should be circumscribed by an elliptic incision. When the spermatic cord is exposed, we dissect away the cellular tissue which envelops it, and we should separate the arteries and veins from the vas deferens, near the upper part of the incision; a ligature is passed around them by means of a curved needle, and we give its ends to be held by an assistant, lest they should be drawn within the abdominal ring by the retraction of the cremaster after the cord is divided. With these precautions, we freely cut the spermatic cord about a third or half an inch below the ligature. Then taking hold of that part of the cord which remains attached to the testicle, draw it slightly forward, dissect-

ing up to the cellular texture and carefully removing all the diseased parts which may adhere to the scrotum.

[LISFRANC'S METHOD.]

After the first incision, which ought to reach the inferior and almost the posterior part of the tumour, dissect from below upwards, to prevent the blood from concealing the parts on which the knife is to be used, which will necessarily be the case, should we dissect from above downwards.

To prevent the retraction of the cord within the abdominal ring, an assistant seizes it between his thumb and two first fingers held a little separated, so that the thumb pressing on the cord in the space between the two fingers, the slipping up will be prevented. Then the surgeon cuts the cord a little below the fingers of the assistant, and ties the vessels as has been pointed out.

[VINCENT KARN'S METHOD.]

The patient being placed as in the ordinary operation, an assistant takes hold of the cord, together with the integuments, between his thumb and two first fingers, above the point where the incision should be begun.

The surgeon takes the diseased testicle in the left hand, insulates it as much as possible from the sound one, and removes with a single stroke of a long straight bistoury, both the testicle and the scrotum which envelops it, by beginning the incision with the edge of the knife a little below the fingers of the assistant, on the upper and outside of the scrotum, to pass between the testicles in the direction of the raphe, at the inferior and external extremity of which the incision ought to terminate. We may also commence at the inferior extremity of the raphe and terminate the incision at where we have described its commencement in the first instance. In either case the wound represents the seg-

ment of a circle whose convexity is towards the sound testicle. The arteries are to be tied.

This method is showy and may be very promptly executed, but it cannot be used if the diseased testicle is considerably enlarged; because in such a case it will be difficult not to cut the septum which separates the testicles, formed by the layers of the dartos.

The operation being finished according to whatever method the case demands, we dress the wound by bringing the edges lightly together by means of adhesive straps, without however attempting to produce immediate union. Some surgeons advise the use of two stitches to draw the edges together; but we reject this practice which can only produce a useless and dangerous irritation. We place a dossil of lint in the lower angle of the wound, and cover the whole with a soft and light compress.

Mr. MAUNOIR, the elder, a celebrated surgeon of Geneva, wishing to avoid the removal of the testicle in cases of sarcocele has thought of wasting away the gland by tying up the spermatic arteries, in the following manner:

The patient is placed as if for the common operation of extirpation; the surgeon makes with a convex bistoury a perpendicular incision about an inch long over the cord immediately in front of the ring, after having formed the transverse fold of which we have spoken; he dissects the cord and ties each artery separately by means of a small curved needle.

This operation is tedious enough, and not less painful than the extirpation of the testicle. I have never seen Mr. MAUNOIR perform it but once. It was not successful, for sometime after the patient was obliged to submit to a second operation, for the definitive removal of that organ.

*Excision of the neck of the Uterus.*

This very dangerous operation should never be attempted except in cases entirely desperate. Nevertheless several instances of success are recorded. Cancerous disease, callous degeneration, and cartilaginous alterations of the neck of the womb are the diseases which call for this operation.

The patient lies supine on the edge of a bed or table covered with a mattress, as in the operation for stone: the legs are separated, and the feet are supported by two chairs placed on each side, unless the thighs are supported by assistants. The surgeon being in the middle separates the labia majora, and dilates the orifice of the vagina, with the index and middle finger of the left hand. In the right hand he holds a *speculum uteri* properly warmed in tepid water, and lubricated by fat or mucilage, which he introduces into the vagina nearly up to the handle. The neck of the uterus presents at the end of the speculum, ordinarily somewhat inclined towards the sacrum; in this case the surgeon brings it into a straight position, by raising it with the extremity of a round or some other blunt instrument. The left hand then takes hold of the handle of the speculum, while with the right the operator passes a double hook to the neck of the uterus, seizes it strongly, so that the points of the hooks do not project through its substance lest they should wound the vagina; he then withdraws the speculum: The uterus is then gently brought down to the orifice of the vagina, by drawing slightly on the handle of the hook; he then cuts off all the diseased part with the bistoury held in the third position. The uterus may also be brought out by making it follow the speculum, in proportion as that instrument is withdrawn.

If we wish to operate without the speculum, the forefinger of the left hand is passed into the vagina, as far



as the neck of the uterus, which if not in a straight position, we bring into the direction of the vagina: we then introduce the hook with the right hand along the palmar surface of this finger, taking care to glide the hook on the finger, and not against the walls of the vagina, to avoid injuring them. The neck of the wound is then laid hold of with the hook, the points of which are directed by the end of the finger in the vagina; and we cut off the diseased portion at the orifice of the vagina, as in the preceding case. We may, also, if we wish, perform this excision with strong scissors curved on the flat side. The hemorrhage is arrested by some astringent injections, and we plug the vagina with lint, which is retained by a figure of 8 bandage, passed round the pelvis and thighs.

*Excision of venereal excrescences situated on the margin of the Anus, Vulva, and in the interior of the Vagina.*

The patient lies supine on the edge of a bed or table, as in the operation for the stone. Two assistants standing on the outside of each thigh keep the thighs separated and flexed upon the pelvis. The assistant on the right side passes his right hand under the thigh of the same side, and takes hold of the patient's arm above the wrist; her other hand is fixed on the upper part of that arm; the assistant on the left side does the same with the left arm. The patient is then prevented from making movements which may interrupt the surgeon. The latter kneeling between the thighs on his right knee, separates the buttocks with the thumb and fore finger of the left hand, to stretch the skin surrounding the anus, and holding in the right hand the flat curved scissors,

he cuts the venereal excrescences as close as possible to the surface of the skin, a part of which he removes; if the excrescences are disposed in groups, he removes each group at a single cut, but if otherwise he removes each of them singly.

When a female is the subject of operation, and the excrescences are situated on the outside and inside of the labia majora, we first remove the external; then separating the labia with the thumb and fore finger of the left hand, we excise the excrescences at their base, taking also a part of the mucous membrane. If we cannot stretch the skin, we make a fold of it, by which the excrescence is made to project, and may be removed with greater facility. It sometimes happens, that after removing a cauliflower excrescence, a considerable hemorrhage ensues. It would be dangerous to apply caustic to so extensive a surface; hence we arrest the hemorrhage, by compresses of lint powdered with rosin. I have, however, seen Mr. CULLERIER stop a copious hemorrhage by touching with a pledget of lint dipped in diluted hydro-chloric acid, a large wound, resulting from the excision of several cauliflower excrescences of an enormous size, situated on the labia majora. A compress is placed over the lint, and sustained with considerable pressure, by means of a suitable bandage.

### *Excision of the Clitoris.*

This organ is occasionally so much enlarged as to project beyond the labia majora; and it has been proposed to remove it for the cure of nymphomania, as it is the principal seat of sexual pleasure. Cancerous tubercles, or fungous growths forming on the clitoris also render it necessary that it should be removed.

*Operation.* The woman lies supine; the assistants hold

her as for the removal of venereal excrescences, if there be danger of restless movements; but this precaution is not necessary if the patient is tractable. The labia are separated by the thumb and fore finger of the left hand, the surgeon takes hold of the clitoris with a single hook and raises it; he then takes the handle of the hook in his left hand, and with the right removes the clitoris by a single cut of the flat curved scissors. If the hemorrhage is abundant, the arteries are taken up; if not, we use a plug of lint sprinkled with powdered rosin. A compress and figure of 8 bandage will retain the whole properly.

### *Excision of the Nymphæ.*

When the disproportioned size of the nymphæ is the result of malformation, there is no other mode of correcting this deformity than by the excision of the parts.

*Operation.* The patient lies supine, with the thighs separated. The surgeon separates the labia majora with the thumb and fore finger of the left hand. With the right, armed with the flat curved scissors, he cuts off the nymphæ one after the other. The hemorrhage is arrested by the affusion of cold water or an astringent fluid. A compress of lint is applied and retained by means of a bandage.

### *Excision of part of the sterno-mastoid muscle in case of Wry-neck.*

When this deformity is the result of spasmodic contraction or paralysis of one of the sterno-cleido-mastoid muscles, it may sometimes be corrected by means of an operation. In the first case we divide some of the fibres of the diseased muscle; in the other, on the contrary, we

cut some fibres of the sound muscle to establish an equilibrium between two antagonist muscles.

The history of the following case may serve as a guide in the practice of this operation, and a proof that it may be attempted with success.

A girl of about ten years old was affected with wry-neck nearly from her third year, in consequence of a continual spasmodic contraction of the right sterno-mastoid muscle; she entered the Hotel Dieu in the month of January, 1822. Towards the sixteenth of the same month Mr. DUPUYTREN performed the following operation.

The patient was placed fronting a window, the head inclined to the left against the breast of an assistant; the point of a straight bistoury was thrust through the skin exactly in front of the sternal extremity of the contracted muscle. The handle of the bistoury was then depressed, to glide the knife flatwise under the muscle, until it came out at the outside of the clavicular border. The edge of the knife was then turned forwards, and a sufficient number of the muscular fibres were divided, by sawing with the knife, to allow the head to regain its natural position.

By this method the integuments were not divided, and the deformity of a cicatrix was avoided; an end the more desirable as the patient was a female.

The fibres were kept separated by depressing the clavicle and inclining the head to the left side. To accomplish this the right hand was strongly fastened to the foot, by means of a roller bandage; the leg being flexed nearly as in the operation for stone. Another bandage was passed round the head and under the axilla.

The patient was put to bed. At the end of thirteen days the wound was completely healed; the motions of the neck were free, although it was a little inclined to the left, in consequence of the length of time it was con-

fined to that position. The bandages were re-applied until the twenty-first of February, at which time they were finally removed. The movements of the neck were perfectly free in every direction, and the head was but very slightly inclined to the right.

If we operate on a man we divide the fibres from their anterior surface, after having made a transverse incision through the integuments. To keep the divided fibres properly separated we fill the wound with lint, and apply a roller around the head and under the axilla of the opposite side.

It must not be forgotten, when the wry-neck is produced by paralysis, that it is the sound muscle which should be more or less deeply divided. In all cases we operate on the side to which the head inclines.

*Incisions to remedy imperforation of different openings, such as the anus, vagina, nostrils, &c. &c.*

This malformation is generally caused by a membrane of different degrees of thickness, which closes these orifices.

If the membrane to be operated on occupy the orifice of the anus and vagina, of the nostrils, or of the external ear, we divide it by a crucial incision, and remove the flaps to prevent their re-union, if their thickness be somewhat considerable. We then introduce a tent of lint into the wound in order to prevent the adhesion which may take place, especially at the anus, without this precaution.

*Imperforation of the lips.* Whether this depend upon a membrane or upon the adhesion of the surfaces of the lips, we operate in the following manner: The infant being seated or lying supine, we destroy the adhesion by cutting through it. We use either the bis-

toury or scissors introduced on a director. When the imperforation is not complete, we introduce the director well greased, through the opening; or if no opening exist we make a slight puncture at one of the angles of the mouth to introduce the director, which is directed exactly along the depression which exists at the point where the lips come into contact. No particular dressing is required after this operation. The cries and sucking of the infant are sufficient to prevent the re-union.

*Imperforation of the Uterus.* The orifice of the uterus may be obliterated by the agglutination of the lips of the os tinæ. In such a case the patient lies supine, the thighs separated and slightly flexed upon the pelvis; the surgeon introduces a *speculum uteri* into the vagina, to expose the neck of the womb. He then introduces a long straight bistoury to the bottom of the vagina, and cuts transversely from one angle to the other of the depression in the os tinæ. The lips of the wound are kept apart by means of a tent of lint spread with cerate.

*Imperforation of the Urethra.* If there be nothing but a membrane at the orifice of the urethra, a slight incision made with a lancet, in the natural direction of this canal, will be sufficient. The flow of the urine will prevent the re-adhesion of the parts. When the imperforation extends through the whole of the glans, we pierce it from its apex to its base with a small trocar, or with a lancet, if the surgeon be very expert: we then pass a canula through the wound, and keep it there for some days.

*Imperforation of the Eyelids.* This malformation called anchiloblepharon, occurs when an unnatural, complete or incomplete adherence exists between the edges of the lids. It may either be congenital or produced by the small pox, or some other inflammation.

*Operation.* The patient being seated, or lying supine, if the imperforation be complete, we make a small inci-



sion towards the outer angle of the eye: by this opening we introduce a small grooved director, well oiled, the groove being directed exactly to the junction of the two tarsi. Should the convexity of the eye prevent us from pushing the director entirely to the internal angle, we cut between the two lids upon the groove, from the point by which the sound was introduced: after which it easily arrives at the internal angle, and the incision is finished. Should it not be inconvenient to introduce it at first from one angle to the other, the operation will be much more promptly concluded. When the occlusion is incomplete, the director should be introduced by the opening which naturally exists. To prevent the renewal of the adhesion we use mucilaginous injections from time to time, and anoint the edges of the lids with some cerate occasionally. (For *imperforation of the iris*, see artificial pupil.)

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## OPERATIONS FOR THE EXTRACTION OF FOREIGN BODIES.

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### *Of Polypi.*

The means most generally employed for the destruction of polypi, are extirpation, and the ligature; we shall describe the different methods employed in the most common cases.

*Extirpation of Nasal Polypi.*

The patient is seated in front of a window, with the head thrown far back, and firmly supported against the breast of an assistant. The surgeon stands before him, having a pair of polypus forceps in the right hand, whose blades and extremities should be narrower than are generally used, in order that they may move freely in the nasal cavities. He causes the patient to open his mouth, and introduces the fore finger of his left hand, in a state of supination, as far back as behind the velum palati, and places the end of this finger against the posterior opening of the nostrils: he then introduces the closed forceps into the nostril, in the direction of the external opening: but he soon elevates the hand, in order to pass it parallel to the floor of the nostrils, should the polypus be situated near their posterior part. In the contrary case, he directs the forceps towards the polypus, sometimes upwards, laterally, &c.

Having reached the polypus, he separates their jaws, and seizes it as closely as possible to the point by which it arises; the index finger placed at the back part of the mouth, is here of great utility, in directing the jaws of the polypus, when seated far back. He then gives the forceps a twist, and drawing them forwards, pulls off the polypus. If this cannot be done at the first effort, or if the polypus is only detached in fragments, still preserving adhesions to the pituitary membrane, or should there be several polypi, the surgeon uses the forceps several times, if necessary, and endeavours to break the pedicle, by continuing the combined movements of traction and twisting. We sometimes experience great difficulties in bringing out the polypus tumours, after having detached them: in this case, it is necessary to remove them by fragments, or to extract them by

means of the disjointed forceps of RICHTER, the blades of which are introduced separately, and then brought together, just as is done with the obstetric forceps. We may also push the polypus backwards, and extract it by the mouth, if it be situated near the posterior part of the nares.

To ascertain whether a polypus excrescence be entirely removed or not, the surgeon compresses the nostril of the sound side, and requests the patient to blow through the other nostril, keeping the mouth closed. If the air or injections pass freely, if we cannot perceive, by looking into the nostril, nor by the use of the forceps, any vestige of the polypus, the operation is crowned with success.

A few injections of cold water, or a slightly astringent fluid, suffices to arrest the hemorrhage. But if it be very copious, and these means insufficient to arrest it, we must have recourse to plugging. (See plugging of the nasal fossa.)

There are some cases, in which, by pushing the tumour alternately, from one side to the other, it is detached, and may be removed by the nearest opening. To do this, the fore finger of one hand is introduced into the mouth, to its back part, and the little finger of the other hand is passed into the nostril, for the purpose of making the motions indicated. The forceps closed, will answer instead of the little finger, if that cannot be introduced.

### *Ligature of Nasal Polypi.*

This method is especially employed in polypi situated at the posterior part of the nostrils, though the preceding operation can, and ought to be preferred, even in this case.

## [BRASDOR'S METHOD.]

The instruments necessary are, 1st. Bellocq's director; a wire, commonly of silver, from fourteen to fifteen inches long, bent so as to form a loop in the middle, and forming two hooks at its extremities, to receive a hempen thread, two or three inches long, the ends of which are tied together, so as to bring the extremities of the wire into contact. 2d. A cord formed of several strands of waxed hempen thread, passed through the loop of the wire, and whose two ends are brought together, without tying. 3d. A double cylinder, destined to receive the two ends of the wire.

Every thing being prepared, the patient sits on a chair facing a window, with his head leaning against the breast of an assistant. The surgeon introduces Bellocq's director into the nostrils in the direction of its floor until it arrives beyond the posterior opening behind the velum palati. He then pushes the stylet, which is thrown forwards through the mouth till it is on a level with the teeth in the upper jaw. To the button of this stylet he attaches the thread which unites the two extremities of the wire, withdraws the stylet into the canula, and brings the director out of the nostril, to bring forward the loop formed by the wire, which he follows with his left fore finger in order to direct it upon the polypus, which this loop should embrace exactly, and as near as possible to its pedicle. If the fore finger be insufficient to direct the loop, on account of the height or distance at which the polypus is seated, its place is supplied by drawing on the string which was thrown around the loop of wire. This string serves also to draw back the loop when it has taken an improper direction. When the polypus is perfectly secured, which we know by drawing on the two extremities of the wire, we remove the string from the loop, by pulling one of its ends. The extremities

of the silver wire are then detached to introduce each of them through the double canula; they are fixed to the rings at the top of the canula to twist them and strangulate the polypus, which is accomplished by turning the instrument round and round. The ligature is tightened daily by means of the double canula, which is left projecting from the nostril, and secured by a thread to the nightcap of the patient. Eight, ten, fifteen or twenty days commonly suffice for the removal of the polypus; though the time required for this purpose will be proportioned to the volume of the tumour.

We may substitute a simple waxed twine for the wire, with which we also make a loop and fix it to the button of the stylet; but this loop is with difficulty kept open: the following mode of passing the ligature would be better.

Introduce Bellocq's director between the pedicle of the polypus and the external or internal wall of the nasal fossa; we then push the spring into the mouth, to which we attach one end of the twine which is to be brought out through the nostril. The director is then to be passed between the other side of the polypus and nasal surface, when the spring is to be again pushed forward through the mouth, and the other end of the ligature attached to the button, and brought back in the same manner. The tumour is then encircled, and the ligature is gradually tightened to strangulate the tumour as in operating with the wire. Instead of the double canula many surgeons prefer the knot tier of RODERICK. The two ligatures are passed through the lower ring of the instrument, which is then introduced on the floor of the nasal fossa, till it arrives at the pedicle of the polypus, which is strangulated with a greater or less degree of force. The constriction should at first be moderate; it is increased every two or three days by pushing the instrument, at the same time the ligature is tightened,

the extremities of which are secured around its superior extremity. The instrument is left in the nasal fossa until the polypus falls off.

### *Extraction of Polypi from the Maxillary Sinus.*

These tumours have always been attacked since their existence has been known, whatever be their size or species, either by extirpating them with polypus forceps, through a fistulous opening, enlarged for the purpose, when there was one, or by an opening made or enlarged when the polypus presents towards the alveoles of one or more teeth fallen or drawn out, or finally by perforating the maxillary sinus below the prominence of the cheek bone, or the depression behind the canine tooth.

When we wish to enter the sinus by the breach through the gums made by the natural or artificial removal of the third and fourth molar teeth, which correspond precisely to the middle of the lowest part of the sinus, inbulate the surrounding portion of the gums by four incisions, two of which are longitudinal, one on the outside, the other within; two transverse, one anterior and the other posterior, which cut the two former at right angles. The portion of alveole thus circumscribed and insulated is removed by forceps, whose jaws are strong and studded with asperities. This operation is altogether free from pain.

After this we perforate the alveolar surface with a pointed perforator with a squared handle, which is worked by turning it round and round. This first instrument is intended to prepare the way for another perforator, whose point is truncated and rounded, for the purpose of enlarging the first opening without danger of interfering with the superior wall of the sinus. The opening should be sufficiently large to give entrance not



only to the jaws of the forceps, but to the polypus caught between them. After the sinus is opened to a proper extent, we introduce the closed polypus forceps into it; but if the tumour present immediately over the orifice, the jaws of the forceps should be opened. The polypus is seized, and the forceps are slightly twisted to detach the tumour which is brought out. Should the whole of the tumour not be brought away, at the first effort, or if there are several tumours, the forceps are repeatedly introduced. The finger is then passed into the opening to ascertain whether the whole of the tumour has been extracted, and to discover the place where it grew. When nothing but the root of the polypus remains it should be destroyed with caustic, or still better with the actual cautery, in different forms, introduced by means of straight or crooked handles, according to circumstances. This cauterising is indispensable, if we wish to prevent the repullulation of the polypus excrescence.

If the walls of the distended maxillary sinus, nevertheless, preserve their integrity as well as the teeth, the perforation should be performed at a point where the bones are thinner and more distended.

If, on the other hand, the walls of the sinus have yielded equally at all points, and all the teeth are sound, we perforate the cheek bone in the depression below the infra orbital foramen.

To this end we commence laying the bone bare, by cutting concially through the integuments, and perforating it in the manner heretofore indicated, that is to say, first, with the pointed perforator, and then with a blunt and truncated one. We should also have another instrument, curved at the point, to remove the asperities which the trephine may have produced. We extirpate the polypus, as when we open the sinus from the alveolar edge.

When the operation has been carefully performed,

the sinus becomes covered with florid granulations, the osseous walls approach, and gradually resume their natural condition; but the complete cure cannot be expected for some months, or even years. If pus or other matters accumulate in the sinus during the course of the cure, we clean it out by occasional injections of emollient or other substances from the external wound, if it be not yet closed.

### *Extirpation of Uterine Polypi.*

We remove these polypi by excision, extirpation, and ligature. Excision is a bad method, difficult to be performed without injuring the neck of the uterus, unless it be brought down to the orifice of the vagina, with a double hook, which cannot be done except by fixing the hooks into the substance of the organ.

The extirpation of the uterine polypus is only practicable when its pedicle is small; in this case the operation may produce a considerable laceration, which may be followed by a dangerous hemorrhage. The following is the mode of performing the operation.

The patient lies supine, so that the pelvis projects a little beyond the edge of the bed; the feet are each placed on a chair, the thighs being separated from each other. The surgeon kneels on the right knee between the thighs of the patient, and introduces the fore finger of the left hand into the vagina as far as the polypus: with the right hand he introduces the polypus forceps, with rather large jaws, which he glides along his finger until it attains its extremity. He then opens the forceps to seize the polypus, gives them a slight twist to detach and draw it out, by withdrawing the forceps and finger at the same time.

It is not absolutely necessary to place the patient

in the position above stated: we may operate as well with the patient standing up, or lying down in the ordinary manner, the thighs being separated, and slightly flexed on the pelvis.

If the operator wish to act with more precision, there is nothing to forbid the use of the speculum uteri.

The hemorrhage is arrested by injections of cold water; if the flow of blood be copious, and if this does not suffice to check it, we render the injection slightly styp-tic, by the addition of some astringent substances, as sulphate of alumine, sulphate of zinc, &c.

### *Ligature of Uterine Polypi.*

This is the surest mode of all, and the one most generally employed.

#### [DESAULT'S METHOD.]

We shall dispense with the description of DESAULT'S instrument for tying polypi of the uterus, since it is generally well known to surgeons. Two separate canulæ, receiving each a moveable steel rod, having an elastic ring, which opens and shuts at pleasure, one of RODERICK'S knot tiers, a waxed ligature not twisted, about three feet long, passed through the elastic rings, forms the whole of the apparatus.\*

The patient being disposed, as in the preceding case, the surgeon introduces, parallel to each other, both the canulæ provided with the ligature, whose ends are fixed to the ring, between the tumour and the walls of the vagina, on the side where there is the least resistance,

\* The student will find in GIBSON'S Surgery, excellent representations of most of the instruments referred to in this work.

and glides them by slight movements, to the superior and anterior part of the pedicle. He detaches the ends of the ligature, fixed as we have stated, takes one of the canulæ in each hand, making them meet together, by describing the circumference of the tumour, he forms a loop around the pedicle, with the middle of the ligature, which he gradually relaxes in proportion as it is employed to encircle the tumour.

When the two extremities of the canulæ meet, arriving from opposite directions, the points are made to cross each other, in order to embrace the tumour more completely. We may also hold the left canulæ steady, while with the right, we move round the whole circumference of the tumour. This being done, the surgeon withdraws the canulæ, carrying the ligature whose blades separate themselves, slightly downwards, the rings open, allow the ligature they contain to drop, and the instrument is then withdrawn entirely. We then introduce the two ends of the ligature, with the ring of a canula, whose length ought to be proportioned to the height of the polypus. We then push this ligature upwards, at the same time that the two ends of the ligature are drawn down, and when the loop is sufficiently tightened, we fix the two ends to the groove of the canula remaining in the vagina, until the tumour falls off. The ligature is to be tightened every two or three days, or even every day, after having detached the ends fixed to the canula, and drawing on them at the same time that the canula is pushed upwards.

### *Laryngotomy.*

This operation is divided into laryngeal and tracheal. When the larynx is cut, it is called laryngotomy; and tracheotomy, when the trachea is operated on. It is

first performed, to allow the access of air to the lungs, the second for the removal of foreign bodies fallen into the trachea.

When there is imminent danger of suffocation, whether in consequence of disease, as the croup\* or other irritation, or from the presence of foreign bodies in the windpipe, it becomes necessary immediately to perform one of these operations. They have also been resorted to in some cases of asphyxia, when there is no other mode of inflating the lungs.

*Laryngotomy.* The patient lies supine, or is placed in a chair, the head being inclined as far backward as possible, without danger. The surgeon being on the right side, seeks for the space which exists between the cricoid and thyroid cartilages, then makes a perpendicular incision from above downwards, through the middle of this space, from the inferior edge of the thyroid to the superior edge of the cricoid cartilage. This first incision should only extend through the skin. We then place the fore finger of the left hand on the ligament which separates the two cartilages just mentioned, to direct the blade of the bistoury into the windpipe, making a very small incision from above downwards, or from below upwards, in the same direction. We may also make a transverse incision, by separating the edges of the wound.

If this be not sufficient, it is necessary to enlarge it, by prolonging the incision to the lower edge of the cricoid cartilage, which is thus divided. A canula is ordinarily introduced into the windpipe, through the wound, and its orifice covered with a piece of gauze, to prevent the introduction of foreign bodies. This canula occa-

\* In croup, the operation is necessarily unavailing, inasmuch as the inflammation and effusion extends over the mucous membrane, lining the whole of the air passage.—J. D. G.

sionally irritates the mucous membrane, so that it would be better to leave the opening free, and place the gauze simply over the wound.

*Tracheotomy.* The patient being placed as in the former operation, the surgeon places his fore finger on the thyroid cartilage, and makes a perpendicular incision from above downwards, for an inch or an inch and a half, in front of the middle part of the trachea, and beginning near the lower edge of the cricoid cartilage. This incision exposes the ring of the trachea. The operation is suspended until the blood ceases to flow. The surface being sponged, we then open the trachea from below upwards, to the point where the incision was begun. By following these directions, we are never exposed to the inconvenience of allowing the blood to flow into the trachea, which would unquestionably happen, if the second incision were made immediately after the first. We must be careful not to wound the superior thyroid artery, nor the thyroid gland.\* If the air expelled by the lungs be insufficient to drive the foreign body from the trachea, we endeavour to extract it with the forceps. After it is removed, we unite the edges of the wound by the first intention, by means of adhesive straps and vest.

### *Œsophagotomy.*

When a foreign body exists in the œsophagus, which can neither be extracted with the fingers or forceps, nor be pushed into the stomach, by means of an elastic catheter or the probang; and when this foreign body impedes

\* The incision, when extended so as to divide the cricoid cartilage, will, in a majority of instances, divide the isthmus of the thyroid gland, and produce a dangerous hemorrhage. The operation is not even as safe as opening the trachea below the isthmus of the gland.—J. D. G.



deglutition, and exposes the patient to the danger of suffocation, by pressing against the posterior part of the larynx or trachea, we should practise œsophagotomy.

[LISFRANC'S METHOD.]

The patient is seated on a chair, having his head inclined backwards against the breast of an assistant. The surgeon placed in front and holding his bistoury in the first position, commences an incision over the internal edge of the left sterno-cleido-mastoideus, as high as the superior edge of the thyroid cartilage, and continues it down to near the lower edge of the cricoid cartilage. If the foreign body project entirely on the right, the operation should be performed on that side. An assistant presses the carotid artery towards the left side of the wound to prevent its being injured by the edge of the knife, while the surgeon dividing the cellular tissue with caution, exposes the œsophagus at the point where it projects beyond the left side of the trachea. A lancet canula, resembling a female catheter, except that it is longer and contains a moveable stylet, having a groove on its curvature, is introduced through the mouth into the œsophagus, the inferior extremity of it being directed towards the left side, and made to project at the wound. Then the stylet is pushed, to pierce the membranes of the œsophagus; the surgeon passes the point of the fore finger over its concave surface in order to discover whether there are any considerable arterial or nervous branches over the course in which he must cut; and after he has taken these precautions he introduces the point of the bistoury into the groove of the stylet, carries its edge turned upwards along this groove, to open the œsophagus for an extent proportioned to the supposed volume of the body to be removed.

During this operation an intelligent assistant ought to use the sponge after every stroke of the bistoury, and if an artery be cut, it should be immediately taken up, however inconsiderable the hemorrhage may be. otherwise the blood will render the rest of the operation more difficult.

In using the lancet canula in the manner we have pointed out, it often happens that the end of the instrument glides through the incision made by the bistoury on the groove of the stylet as soon as the incision is commenced, which may prevent us from making it of sufficient extent, without injuring the posterior wall of the œsophagus. Mr. VACCA BERLINGHIERI, professor of Surgery at Pisa, has devised a canula with a spring stylet, terminated by an olive-shaped, instead of a pointed extremity. The groove of the canula which gives exit to the stylet, is not more than two inches in extent. After having introduced this instrument in the ordinary manner until the end of it elevates the œsophagus, we push the stylet which separates itself from the extremity of the canula by its elasticity, and raises the œsophagus without passing through it. We then introduce the bistoury into the groove of the canula, to cut the portion of the œsophagus comprised between that and the end of the stylet.

The wound is healed by the first intention, applying a slight bandage. The patient should be kept quiet: He should be nourished for some days by means of a gum elastic catheter introduced into the stomach; or better still, he should be nourished by the injection of nutritive substances.

### *Of Gastrotomy.*

When a foreign body has passed entirely into the stomach, and the life of the patient is in danger, without

the possibility of procuring the expulsion of such body, the following operation should be performed.

The patient lying supine, the surgeon armed with a convex bistoury, which he holds in the third position, makes an incision for about three inches over the linea alba in the epigastric region, and in the direction of the muscles, or at the point where the foreign body projects. An assistant separates one of the lips of the wound with the end of the fore finger; after having divided the integuments, cellular tissue, and fascia, the surgeon penetrates with caution into the stomach, by continuing to cut in the same direction.

For fear of passing through and through the stomach would it not be better to make first, a very small opening through the anterior wall of the stomach, capable of receiving a director, upon which the incision might be finished? In performing this operation we ought especially to avoid dividing the arteries which surround the greater and lesser curvatures of the stomach.

If the foreign body present at the opening, we extract it with the fingers; if not we seek for it with the forceps. We heal the wound by the first intention, using adhesive straps, or by means of the quilled suture, as in case of wounds of the stomach.

There are numerous cases which demand artificial openings, for the extraction of foreign bodies in the abdomen, the intestines, the anus, vagina, canal of the urethra, &c. but as these accidents are very variable, it would be impossible to describe in this manual the sort of operation which would be required for each of them.

*Operation for the evacuation of pus contained in a tumour produced by Œdematous Angina.*

This disease sometimes advances with such rapidity that the patient perishes from suffocation, if the pus be not promptly evacuated which accumulates within the walls of the larynx. "Convinced," says Lisfranc, "by dissections, that scarifications made about the larynx would evacuate the serosity or pus, without necessity generally of resorting to pressure, I have thought that in the living subject, the tumour might be scarified; this method I have employed with the fullest success."

We use a slightly curved bistoury with a long narrow blade, firmly fixed in its handle; this we wrap with linen to within a line of its point. The patient separates his jaws as widely as possible, and they may be kept in this position by the introduction of pieces of cork far back within the teeth, one of the extremities of which may be held by an assistant. The surgeon, placed before the patient, whose head rests upon a pillow, or against the breast of an assistant, introduces the fore and middle finger of his left hand into the mouth, beyond the isthmus of the fauces, arrives at the tumour produced by the quinsey: then holding the bistoury by its handle in the third position, like a pen, it is glided flatwise, on the fingers within the mouth; arrived at the larynx, the edge is directed forwards and upwards, the handle is elevated and depressed so as to press lightly with the point; thus the tumour will be opened. Possibly, long and acute angles may open the tumour. We should make few punctures, because by the aid of pressure, two or three small incisions are often sufficient. If necessary, these are multiplied; we attempt to make them at the greatest possible distance from each other to avoid the consequences of inflammation.

These scarifications produce the flow of the infiltra-

ted matter, and sometimes a slight sanguineous discharge, which produces a salutary effect.

### *Of Catheterism.*

Before describing the operation for stone, we shall speak of the different methods of sounding the bladder, an operation to which the name of catheterism has been given. However simple this operation may appear, we continually meet with untoward accidents, resulting from inexperience.

Common method.—*Catheterism in man.* The patient lies supine upon a bed, with the thighs slightly flexed upon the pelvis, or rather he is placed on a table, if the operation for stone is to be performed. Suppose the surgeon to be placed on his left side. He takes the middle of the penis between the middle and ring finger of his left hand, the thumb and fore finger of this hand are applied over the gland to bring back the prepuce, and present the canal of the urethra to the beak of the sound or the catheter. Having thus laid hold of the penis, he holds it inclined downwards so as to make with the axis of the trunk, an angle of about  $45^{\circ}$ . He then takes the catheter in the right hand, by applying the thumb upon the side of its ears which correspond to its convexity, the index and middle fingers on the opposite side. The extremity of the catheter is then introduced into the canal of the urethra, by holding the right hand in semi-supination; with the left hand he draws the penis upon the catheter by carrying it towards the abdomen, so that the penis and catheter describe two arcs of a circle which enter each other by moving in opposite directions. When the point of the catheter has reached the arch of the pubis, the surgeon brings it perpendicular to the axis of the body, without exerting the slightest pressure. He slightly raises the

instrument to avoid the folds which form upon the mucous membrane of the urethra before its extremity. At the same time he pushes it forwards to make it glide under the arch of the pubis, and enter the bladder. The catheter is no longer kept perpendicular; he inclines it towards the thighs, making a strong movement of pronation with the hand guiding it. When the surgeon is placed on the right of the patient, he takes hold of the penis with the right, and the catheter with the left hand, and proceeds in the way above mentioned. Should any false passages exist, in which the point of the catheter may be entangled, or rather should the introduction of this instrument become difficult from any other cause situated near the neck of the bladder, which makes it deviate, we grease and introduce the fore finger into the rectum, to direct the catheter through the membranous part of the urethra, and the portion of it embraced by the prostate.

*The master-stroke.*—The patient being placed as in the preceding case, the catheter is introduced with its convexity towards the belly until it arrives at the root of the penis. We then give the instrument a half turn, by bringing the hand conducting it in front of the abdomen, and finish the introduction as in the ordinary way.

*Abernethy's mode.*—The patient lies across a bed or on the side of a table, as if to be operated on for the stone. The legs are pendant, and sufficiently separated to allow the surgeon to stand between them. The surgeon then takes the penis between the middle and ring fingers of the left hand, uncovers the gland with the thumb and fore finger of the same hand, by placing them at some lines distant from the orifice of the urethra. He lowers the penis upon the scrotum, and holding the catheter in the right hand, with the thumb on the side corresponding to its convexity, and the fore and middle fingers on the opposite side, he introduces it so that the concavity



of the instrument corresponds exactly to the direction of the raphe. He raises the penis and catheter until the point of the instrument touches against the symphysis pubis. He then once more lowers the handle of the catheter between the thighs at a right angle with the body, and passes it into the bladder, continuing it in that direction by gliding it under the pubis; he then gives it the master-stroke to bring it to the ordinary position. These different movements are made in a few seconds.

*Amusat's mode.*—This consists in the employment of a straight catheter, which is passed into the bladder by keeping it constantly in the direction of the passage through the neck of the viscus. The author of this mode thinks it may become useful to saw a calculus in the bladder, by allowing of the introduction of a saw and an instrument to lay hold of the stone, through the catheter.\*

The catheter often meets with obstacles, owing to stricture of the urethra which are at first invincible. Mr. DUPUYTREN advises, that for some time a compression should be made against these obstacles, by which it often happens, that they are overcome. For this purpose the catheter is fixed in the following manner: we have ready a small iron ring covered with cloth, the circumference of which slightly exceeds that of the penis; we pass the penis and catheter through the ring. Four strings of tape on its upper edge, equally distant from each other are fixed above to the ears of the catheter. Four other tapes are fixed upon the lower edge of the ring, two of which passing below each thigh are

\* All the world has heard of the instrument devised by Mr. CIVIALE for this purpose. It is feared, notwithstanding all the improvements made upon this instrument, that it will by no means equal the expectations originally formed of it. Dr. HORNER has given a description of a very superior instrument devised by that ingenious artist Mr. ISAIAH LUKENS. See Philadelphia Med. and Phys. Journal, vol. i, new series.—J. D. G.

brought in front of the abdomen, and fixed with pins to a bandage round the body, or better still to a suspensory. The two other tapes are carried in front of the pubis, and fixed in the same manner. We may employ the same means for keeping the sound in the bladder; introducing a cork into its external opening.

*Catheterism in the female.*—The patient lies supine, with the thighs separated, and slightly flexed on the pelvis. We then separate the labia and nymphæ with the thumb and fore finger of the right or left hand, as the position may require, in order to discover the meatus urinarius. The catheter being held as heretofore directed, we introduce its lower extremity into the canal of the urethra, and push it on until it enters the bladder. Nothing is easier than this operation.

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## LITHOTOMY.

This operation, which consists in the removal of one or more stones from the bladder, may be performed according to different methods, which have each a particular name.

If we open the bladder from the *perineum*, it is called the lateral operation; above the pubis, the high operation: by the rectum, the rectovesical operation. In the female we cut between the rami of the pubis.

### *Lateral operation with the lithotome caché.*

The patient is placed on the edge of a table, with his back supported by a mattress; his thighs separated, and flexed upon the abdomen, and holding the soles of his feet with the palms of his hands, we pass a turn of the bandage across the back of each foot, and round each hand to bind them to the feet. We may then pass a roller under each knee and over the shoulders, to be

tied on the back of the neck. Instead of all this, an assistant placed on each side, and standing outside of the thighs, may hold them apart, and flexed to the necessary degree. The perineum should be shaved.

The surgeon then, taking an oiled staff between the thumb and two first fingers of the right hand, introduces it into the bladder in the manner heretofore indicated. He then once more assures himself of the existence of the calculus, by moving the staff in different directions, if the stone be not touched at first. He then gives the handle of the catheter to the assistant on the left side, who holds it perpendicular to the axis of the trunk of the body, nevertheless having its groove a little to the left; the other assistant raises the scrotum. The surgeon then places himself between the thighs of the patient, kneeling on his right knee. Then taking a straight bistoury, which he holds in the first position, he makes an incision through the integuments and cellular texture, by commencing twelve or thirteen lines in front of the anterior edge of the anus, immediately over the raphe; he continues this incision downwards and outwards in the direction of the line, which, (supposing the space between the tuberosity of the ischium and anus divided into three equal parts) would pass through the junction of the middle with the external third, and stop at another right line, passing from the tuberosity of the ilium to the centre of the anus. In finishing the incision the wrist is lowered. He again passes the bistoury into the thickness of the perineum, to cut in a similar manner the ejaculator seminis and erector penis, and transversus perinei, as well as the anterior fibres of the levator ani, by lowering the wrist still more than in the first incision.

The index finger of the left hand is then introduced into the superior angle of the wound, by directing downwards its radial edge, to place the nail in the groove of

the staff. The point of the bistoury, still held in the first position, is conducted along this angle until it reaches the groove, of which we assure ourselves by rubbing the point of the knife against the staff: the urethra is then cut from above downwards for the distance of five or six lines, by raising the wrist. The nail is constantly held in the groove of the staff to serve as a guide to the lithotome caché, which is introduced closed, with its concavity turned upwards. When we are satisfied that this instrument is in the groove, the surgeon takes the handle of the staff in his left hand, and in proportion as he lowers it, by making it describe a circular line, he pushes the lithotome into the bladder along the staff until it strikes against the extremity of the groove: the staff is then withdrawn. Then he places the lithotome so that its blade corresponds to the direction of the external incision. He then opens it by pressing with the right hand on the spring, after having placed under it which ever of the numbers engraved on the handle of the instrument he thinks proper: he then withdraws it in the direction of the external incision, by supporting the sheath with sufficient force above and within the wound to avoid the division of the pudic vessels. The fore finger of the left hand is again introduced to serve as a guide to the forceps, unless the gorget be preferred. In this case LISFRANC advises the introduction of it with the concavity turned upwards, along the palmar face of the left fore finger placed in the superior angle of the wound, instead of introducing it with the concavity turned downwards, and then turning upwards, which doubles the time and the pain. The forceps are then introduced along the concavity of this instrument, taking care that one of the jaws are on the right, and the other on the left, so as to embrace the beak of the gorget: we withdraw the latter instrument in the same manner it was introduced. We then seek for the stone with the forceps closed; when it is

found, the jaws of the forceps are opened to lay hold of it according to its smallest diameter, if possible. When the stone is secured we rotate the forceps in order to be sure that we have not taken hold of the coats of the bladder, and then extract it by moving the forceps from side to side.

Instead of using the lithotome, we may introduce the blade of a bistoury into the bladder with the same precautions; then open it in the direction of the incision, by strongly depressing the wrist, to avoid the pudic arteries. This requires more experience in the surgeon than the lithotome caché.

*Lateral operation with the knife.*

[LISFRANC'S METHOD.]

The patient being disposed as before directed, the staff entrusted to an assistant, and the groove slightly turned to the right or left, according to the side upon which we wish to cut, as the choice is indifferent, although Mr. LISFRANC prefers the right. The surgeon then, armed with a straight knife, of moderate length, plunges the point of this instrument into the perineum, at the height heretofore mentioned, that is about thirteen lines in front of the anterior edge of the anus, in an adult, and somewhat lower in a child, until it reaches the groove of the staff, of which we are assured by its grating on the metal. Seizing then the handle of the catheter with the left hand, he depresses it, to introduce the knife into the bladder, in the manner we have described, for the introduction of the lithotome caché; the wrist is then lowered, in order to make an incision in the same direction, and of the same length as that made through the skin with the bistoury; when we operate with the lithotome caché, the only difference

is, that we enter the bladder at the first stroke. The rest of the operation does not differ from what has been described in the preceding article.

We have seen Mr. LISFRANC perform this operation with an astonishing promptitude and dexterity: to operate in this way, the surgeon should have clearly in his mind, the arrangement of the different parts he is to divide; moreover, he should be exceedingly expert.

*Lateral operation with the gorget.*

Having cut the prostate with the point of the bistoury, and keeping the nail of the left fore finger in the groove of the staff, as at the moment when we are about to introduce the lithotome caché, the surgeon takes the gorget in his right hand, its cutting edge being directed obliquely outwards and downwards; he introduces its point into the groove of the staff, of which he is assured by the grating of the metals against each other. He then seizes the handle of the staff, with the left hand; lowers it at the same time that he pushes the gorget into the bladder, until it strikes against the extremity of the groove, and cuts the bladder in entering; the staff is disengaged and withdrawn. Taking the handle of the gorget into the left hand, he takes the forceps with the right, to introduce them into the bladder, using the gorget as a conductor, as we have already said, while speaking of the lithotome caché. The forceps being introduced, and the gorget withdrawn, we finish as usual.

The operation ended, we remove the patient to bed, bringing the thighs together, which ought to be slightly flexed on the pelvis; the best dressing is to apply nothing at all, unless there should be hemorrhage, in consequence of opening some artery. In such case, we use the common compress.



*The high operation.*

If the size of the stone be too considerable to be extracted through the perineum, we open the bladder, by cutting above the pubis.

The patient lies on his back, having the thighs slightly flexed upon the pelvis: the hair is shaved off the pubis. The surgeon, provided with a bistoury, which he holds in the third position, makes an incision over the linea alba, which in the adult, extends from about two inches above the symphysis pubis, nearly down to the angle formed by the skin in ascending to the penis. This first incision only goes through the skin: a second deeper incision divides the fascia superficialis, and we separate as far as possible, the bellies of the pyramidal muscles. We cut through the insertion of some of these muscles, at the arch of the pubis, as well as the fascia behind them, by making along this bone a transverse incision, which cuts the first at right angles. We begin a new incision, starting from the last, in the direction of the first cut: the fore finger of the left hand is introduced between the peritoneum and the fascia last mentioned, which immediately covers it, and we divide it as high as may be necessary. By this means the bladder is exposed, if it be fully distended with fluid; if not, the surgeon separates with his finger, the very loose cellular texture which covers it. He then introduces a lancet canula by the urethra, much more curved than ordinary, until we perceive its point through the membranes of the bladder, then the stylet is pushed through that part of the bladder, corresponding to the external incision. The bladder is pushed up towards the umbilicus, by means of the canula and stylet which traverse it. Then the surgeon opens the bladder, from above downwards, with a bistoury, whose point is directed along the groove,

in the concavity of the stylet: then he forthwith introduces the index finger into the bladder, to keep open the lips of the incision. He withdraws the sound, and seizes with his right hand the forceps, to extract the stone, which is commonly done with great ease.

We keep a gum elastic catheter constantly in the bladder through the urethra; and if we have performed the high operation, after having in vain attempted the lateral one, it is indispensable that the catheter should be passed in, from the wound through the perineum, which is not to be finally withdrawn in either case, until the wound is cicatrized.

### *Recto-vesical operation.*

[SANSON'S METHOD MODIFIED BY PROF. V. BERLINGHIERI.]

The patient is placed as for the lateral operation: the staff is held perpendicularly by an assistant, the groove neither being turned to the right nor the left. The surgeon introduces the fore finger of the left hand into the rectum, glides flatwise on the palmar face of this finger, the blade of a straight bistoury; and after having turned its edge upwards, he cuts by a single stroke from behind forwards, and in the direction of the raphe. This incision extends equally through about an inch of the intestine and raphe. The inferior surface of the prostate gland, being thus exposed, the finger easily perceives through the inconsiderable thickness of the parts which separate the rectum and lower fundus of the bladder, which approach each other, the staff, which the assistant should always hold in the same position.

The surgeon passes the point of the bistoury behind the prostate, and again directs it from behind forwards, to make an incision through the prostate, urethra, and

neck of the bladder, by carefully avoiding to injure its lower fundus. By this method, the incision of the intestine will be found about an inch lower than the superior angle of the incision made through the neck of the bladder, and the walls of the rectum form a valve which prevents fecal matter from passing into the bladder.

The stone is then removed in the usual manner.

We neither introduce compress nor lint into the wound; and when the inflammation subsides, we touch the edges of the wound with lunar caustic, to hasten the cicatrization.

### *Operation for stone in females.*

All the methods which consist in opening the canal of the urethra, in any direction, are most commonly followed by incontinence of urine; without stopping to describe them, we shall give LISFRANC's method, which has the advantage of being free from all these inconveniences.

The patient is placed, as for the ordinary operation; two assistants separate the labia and nymphæ slightly: the surgeon being placed between the thighs, introduces a common catheter into the bladder; when it has entered this viscus, with its convexity directed upwards, the handle is given to an assistant, who pressing lightly upon it, from above downwards, depresses the meatus and vagina. The surgeon, who is about to operate between the urethra and the symphysis, seeks with his fore finger, the position of the rami of the pubis and the clitoris; then holding in his right hand, like a pen, a common bistoury, he makes an anteriorly or superiorly convex semilunar incision, while with his left hand he sustains the textures, and marks with his fore and middle fingers, the places where the wound ought to begin and

end. He commences on a level with the lateral surface of the meatus urinarius, passes along the rami and symphysis pubis, at the distance of one line, and terminates on the side, diametrically opposite. The handle of the bistoury should not be so much raised as the point. We may at the same time, in fact, penetrate to the bladder, and even into that organ; but this would be imprudent; it would be much better to cut the resisting textures, layer by layer, and separate the cellular substance with the fore finger, along which the instrument is carried for greater security. It is extremely necessary not to press upon the anterior surface of the exposed bladder, so as to detach it from the body of the pubis.

The surgeon, arrived at the anterior and inferior surface of the bladder, may cut it transversely, after having passed his bistoury into it; but the thumb and fore finger of the left hand should be introduced, the first into the vagina, the second into the wound; by seizing the substance placed between them, the bladder will be tightened, and drawn slightly forward, and then the longitudinal or transverse incision will become more easy and sure.

If this mode of opening the bladder be disliked, we may cut it upon the convexity of the catheter; or rather by substituting for it a lancet canula, and cutting on the groove of the stylet.

The longitudinal incision is parallel to the axis of the muscular fibres of the bladder, but its superior angle is about fifteen lines from the peritoneum.

The transverse incision is perpendicular to the axis of the muscular fibres, but it is situated at a much greater distance from the peritoneum; it ought to be preferred.

The calculus is then removed, as in other cases.

*Extraction of foreign bodies from the Joints.*

Concretions often form within the cavities of joints of such a nature, as to resist all medical treatment. When such concretions irritate the part, so as considerably to impede the motions of the limb, and to endanger the appearance of a severe inflammation, they should be extracted. We shall describe the operation, for the removal of a concretion from the knee joint: This will suffice to give an idea of the manner in which we should act in other cases.\*

The patient lies supine, on a bed or table, the limb being extended, to relax the capsular ligament. The surgeon causes the concretion to approach the inner side of the joint, if possible, by seizing it between the thumb and fore finger of the left hand. An assistant tightens the skin towards the patella, in order that the integuments may resume their place immediately after the incision, and prevent the air from having access to the joint. After having thus disposed the parts, a longitudinal incision is made over the concretion, with a straight bistoury, for an extent proportioned to the size of this body. We then extract it with forceps, and if more than one concretion exist, they are to be successively removed. The wound is healed by the first intention, by means of adhesive straps and a roller bandage. The limb should be kept extended.

*Trephining.*

This operation is performed, for the removal of fragments of bone, or other foreign bodies, driven into the

\* See GIBSON'S Surgery, vol. 2d. for the description of a very interesting case, in which a concretion of great size, was successfully removed by that learned and dexterous surgeon.

cranium, or to allow pus or other fluids effused between the skull and dura mater to be evacuated, or even from within the substance of the brain, provided it be at an accessible point. There are cases, in which it is necessary to make several openings; for instance, when the fissure traverses a suture; because the dura mater adhering to the suture, the effusion takes place on each side, and absolutely requires two openings to evacuate it.

The trephine may be applied at all parts of the cranium, excepting the middle and inferior parts of the frontal\* region, the inferior and anterior angles of the parietal bones, and over the sutures.

The place of operating being decided on, the patient is placed on a low chair, and the head rendered as steady as possible, by the hands of one or two assistants; we then proceed in the following manner:—

The surgeon holding a straight convex bistoury, in the third position, makes a crucial, or V incision, through the scalp down to the pericranium, he dissects up the flaps, raises them, and removes the pericranium, by means of a rugine. He then covers the raised flaps with a fine compress, to prevent them from being injured by the trephine.

When this is done we slip down and fix the pin of the trephine, and then place it upon the centre of the part to be perforated. We then turn the trephine gently

\* By using a large trephine, to cut through the outer, and a smaller one to cut through the inner wall, we may trephine very securely, over any part of the frontal region. The sutures need not constitute a serious objection, as the adhesion of the dura mater to the bone, may be divided after the circle of bone is cut through, by first removing with SCULTET's saw, a portion of the circle made by the trephine, on each side of the suture.—J. D. G.



from right to left, the point of the perforator enters the bone, and when the trephine has cut to the depth of a line or a line and a half, the centre pin is slipped up and secured by its screw. The trephine is then carefully moved in half circles as before, occasionally removed to ascertain the depth to which it has penetrated, and to remove from the groove it has sawed the bony particles with a brush. The nearer we are to the end of the operation, the more slowly do we move. We incline the crown to the side on which the section is the least advanced, so that the whole circumference may be cut through about the same time. When we believe the section nearly completed, we attempt to detach the circle of bone by means of an instrument introduced in the hole made by the centre pin, which sometimes is sufficient for its removal; but when the circle is moveable, as it does not offer resistance enough to allow any thing to be fixed in its centre without the whole being depressed, we raise it by means of elevators passed under its edges. A sort of spatula used as a lever of the first order is the most commodious instrument we can use for this purpose. When the circle of bone is removed, we cut with a lenticular the asperities left on the edges of the opening through the cranium.

If splinters of bone are driven in on the brain, we remove them with forceps. If a purulent collection, or one of any other fluid exists between the bone and dura mater, the motions of the brain will be sufficient to displace it; but should the collection be between the membranes and that organ, we introduce the point of a bistoury through the membranes into the tumour, and if this simple puncture be not sufficient to give issue to the matter, we make a crucial incision to enlarge the opening. The numerous experiments which have been made recently on the brain do not allow us to doubt but that this organ may be wounded without en-

dangering the life of the individual. We are far from wishing, however, to induce practitioners to be rash, especially when they have to do with such delicate parts.\*

The dressing after trephining consists in placing a piece of fine linen called a sindon over the opening, without allowing it to pass between the dura mater and bone, which might cause a useless and dangerous irritation. Over the sindon fine lint is placed, a light compress, and an easy bandage. The patient is then so placed in bed as to allow the fluids an easy escape from the orifice.†

### *Operation for Cataract.*

The object of this operation is to remove the lens from the axis of vision when its opacity prevents the entrance of light. Two methods are chiefly employed, those of depression and extraction.

\* In a case trephined by the celebrated DUPUYTREN, without discovering any fluid either between the dura mater and cranium, or between the membranes and brain, he introduced his bistoury for a considerable depth into the substance of the brain, and evacuated some purulent matter without immediate injury to the patient, who died, however, soon after. The brain has also been punctured in order to evacuate fluids effused within the ventricles, in cases of hydrocephalus internus, with safety and advantage. But the practitioner should by no means imitate DUPUYTREN, for fear of exposing himself to the charge of unreasonable temerity, and bringing the profession into disrepute. When an abscess in the substance of the brain *evidently* projects after the bone is removed, the propriety of evacuating it cannot be doubted.

† In the original the directions given are for the use of the *trepan*, an instrument resembling a joiner's wimble. As this is not employed in this country, we have modified the directions to serve for the application of the trephine.—J. D. G.

*Depression of the Lens.*

To perform this operation, no other instrument is necessary but the couching needle. This needle is of steel mounted on a handle of ivory or ebony, cut in polygon, having some black or white spots, answering to the convexity, or the broad part of the needle. Various shaped needles are used; those of Scarpa, Hey, Saunders, and Sir William Adams are commonly placed in the cases of couching instruments.

If the left eye is to be operated on, the patient is seated in a low chair, fronting a north light, but so arranged as to make it fall laterally on the eye to be couched. The other eye is covered up, that the sight of the surrounding objects may not excite motions which will provoke corresponding movements in the other eye.

An assistant, placed behind the patient, is charged with raising the upper eyelid, with the pulp of his left fore finger, which he applies on the free edge of the lid, towards its middle, so as to press lightly between the lid and the globe of the eye, at the same time that he lifts it upwards. The surgeon is seated in front of him, and a little to his left side, in a chair, raised so as to bring his mouth on a level with the eye upon which he is to operate. He places his right foot on a stool, in order to raise his knee, which serves to support his right elbow, in order that the motions of the hand may be surer and more precise. He then depresses the lower lid, by applying the end of the left middle finger, slightly flexed upon the middle of its free edge; the fore finger remains open and extended, parallel to the middle one, near the external angle of the eye, its internal edge being intended to serve as a point of support to the blade of the needle, at the moment of its introduction. The ring and little fingers are applied to the cheek of the oppo-

site side, so that the nose is placed between the middle and ring finger. We request the patient to turn the eye towards the nose.

Then holding the needle by its handle, like a pen, between the thumb and two succeeding fingers of the right hand, the point being turned forwards, the operator thrusts its point perpendicularly through the sclerotic coat, a line and a half or two lines at most, according to the size of the eye, from its union with the cornea, towards the external angle, and upon a plane which will transversely divide the globe of the eye into two equal parts. The sclerotic being traversed at a single stroke, we raise the handle of the instrument without making any pressure, to carry it horizontally in the direction of the line indicated. The black points on the handle being turned forwards, we penetrate, by following this direction, into the posterior chamber of the eye, behind the iris, and when we perceive the convexity of the point of the needle, by the opening through the pupil, we give the needle some semi-rotatory movements, to lacerate the capsule of the lens. We then turn the black spots on the handle upwards, depress the handle, and push dexterously, until the concavity of the needle arrives at the upper part of the lens. We then raise the handle, without changing the position of the black spots, and by a motion which should be directed so that the point of the needle shall be lowered, somewhat from behind forwards, we depress the lens, and carry it below the axis of vision, into the vitreous humour. We hold it in that position, for six or seven seconds. During the last movement, we direct the patient to turn the eye upwards, without moving the head; we then give the needle a slight degree of rotation, to disengage it; bring the handle to the horizontal position, and if any fibres of the capsule remain in the posterior chamber, we break them away with the point of the needle, and pass them

into the anterior chamber. We then withdraw it at first horizontally, until the edge arrives at the sclerotica, the black spot being turned forwards; we then lower the handle, and bring out the instrument in the same direction it entered. The motions for this operation are reduced to the thirteen following:—

1st. Traverse the sclerotic coat at one stroke, with the handle lowered, the black spots in front.

2d. Carry the handle horizontally; the black spots in front.

3d. Penetrate as far as the posterior chamber; the black spots in front.

4th. A slight rotatory movement to lacerate the capsule of the lens.

5th. Lower the handle of the needle; the black spots upwards.

6th. Push the needle upon the upper part of the lens; the black spots upwards.

7th. Motion for depressing the lens, by elevating the handle, and carrying it slightly forward.

8th. Slight rotatory movement, to disengage the needle, the black spot in front.

9th. Bring the handle to a horizontal line; the black spot in front.

10th. Break down the fragments of the capsule, and push them into the anterior chamber.

11th. Withdraw the needle horizontally, as far as the sclerotica; the black spot upwards.

13th. Extract the needle.

When we operate on the right eye, the needle is held in the left hand, and the operation is performed in the same manner as for the left eye.

The patient should immediately be secluded from the light, to avoid inflammation of the eye.

Should inflammation supervene, which it rarely does, we treat it like ordinary ophthalmia.

If cataracts exist on both eyes, it will be better to allow some time to elapse between the operation on the first and the second.

Nothing but a very light bandage need be placed over the eye. The bed curtains should be kept closed, to exclude the light more effectually.

We do not remove the bandage for ten or twelve days, when we very gradually accustom the patient to the light.

This method is preferable to that of extraction, not only because it is more easily executed, but because we can always attempt the latter, in case that the first be not crowned with success.

### *Extraction of the Cataract.*

The patient and surgeon being placed, as in the operation for depression, the upper lid raised, and the lower one depressed, the operation is thus performed, supposing that the left eye is the seat of disease.

To perceive the point, where the knife ought to be passed through the cornea, it is necessary to suppose a vertical line, which passing through the centre of the pupil, would divide the globe of the eye into two equal parts, one right and the other left; a second line drawn transversely from one angle to the other, would cut the first at right angles; it is in the middle of the external and superior right angle, that the knife should be introduced. This point being ascertained, the surgeon holding WENZEL's knife in the right hand, like a pen, and the edge turned towards the palm, with this elbow supported on his knee, as in the operation for depression, he carries the point of the instrument placed perpendicularly upon the cornea, at a line, or half a line from its union with the sclerotica in the line we have pointed out.



As soon as the cornea is traversed, we gently raise the handle of the knife, to carry it backwards, gliding the blade obliquely, between the iris and cornea, which is pierced inferiorly, at a point diametrically opposite that by which it was entered, and at the same distance from the sclerotica. We then turn the edge of the knife slightly in front, and by continuing to push in the same direction, we finish the division of the cornea.

It sometimes happens that these movements are impeded, because the eye often is directed inwards at the same moment that the cornea is pierced; in this case, it is necessary to direct the patient to turn the eye outwards, and we take advantage of this moment to plunge in the point of the knife.

When the cornea is cut, we take the knife in the left hand, with which we apply the back of the blade upon the edge of the flap, and raise it. With the right hand we introduce through the pupil a cystotome, or a couching needle, carefully to lacerate the capsule. This being done, we press gently the globe of the eye, between the thumb and fore finger of the right hand, and thus produce the discharge of the lens. If the pressure be too great, we may squeeze out the whole or part of the vitreous humour, which may lessen, or completely prevent the success of the operation.

Some oculists who wish to appear expert, open the capsule of the lens with the point, when bringing out the knife. But this trick is of no utility, and serves only to confuse the assistants.

As this operation is rarely practised on one eye, and we ought to wait until both are affected, before attempting it, it is positively prescribed that we must not finish with one eye before beginning with the other. When the cornea of one eye is cut, we suspend this first operation; then we complete that on the other eye, and afterwards finish the first.

We cover the eyes with fine compresses, which are retained by a light bandage, and the patient is put to bed, lying on his back, to prevent the escape of the vitreous humour. The chamber should be as much as possible darkened. We bathe the eyelids daily, with cool water; and should inflammation supervene, we treat it as in ordinary case. It is not until the end of ten or twelve days that the patient is allowed to see the light, to which he should be very gradually accustomed.

### *Operation for artificial Pupil.*

The pupil, which is closed by a membrane, during the first months of life, may remain closed, so that the child is born without sight. To remedy this malformation, we make a crucial incision in the membrane which closes the pupil. For this purpose, we first cut the cornea, as in the operation for the extraction of cataract, and then cut the membrane with an edged needle, introduced from the anterior chamber. But when the pupil is obliterated, in consequence of a disease, or of the operation for cataract, we attempt to make an artificial one. Different methods have been devised to effect this purpose.

#### [MAUNOIR'S METHOD.]

The patient lies down, and the eyelids are separated; the surgeon cuts the cornea, on the side of the external angle with the common instruments for cataract, about a line from the sclerotica, and for the extent of about three lines. Very fine scissors, curved in their length, the blades of which are not more than seven or nine lines long, one of them being very acute, and the other terminated by an olive-shaped button, are introduced

flatwise into this opening. When they have come between the anterior face of the iris and the neighbouring surface of the cornea, we turn them in such a manner as to bring their blades perpendicular to the cornea and iris, and the blades being separated, the pointed one traverses the iris in which the desired opening is made.

[SCARPA'S METHOD.]

The patient is seated and fixed as in the operation for cataract; then with a very slender couching needle, we pierce the sclerotica at the external angle of the eye, about one or two lines from the union of that membrane with the cornea, and we carry the point upwards and inwards to the internal border of the iris. We go very near to the ciliary ligament; perforate upwards the inner edge of the iris until the needle just shows itself in the anterior chamber of the aqueous humour. As soon as the needle is there perceived, we press the iris with it from above downwards, from the internal towards the external angle, as if to carry it parallel to the anterior face of the iris, in order to detach a portion of its edge from the ciliary ligament. This being effected, we lower the point of the needle to rest it on the inferior angle of the principal opening, which we prolong at will, by pressing on the iris towards the external angle of the eye, from front backwards, in a direction parallel to the anterior face of that membrane.

If after the operation, some opaque flocculi appear, we break them in pieces with the point of the needle, to push them through the new pupil into the anterior chamber, where they are gradually dissolved in the aqueous humour and absorbed.

The blood which is necessarily effused by this operation, into the anterior chamber of the eye, clouds the transparency of the aqueous humour; but this accident

is not alarming, as the blood will be certainly absorbed, and the eye regain its previous brilliancy.

Should the cornea be opaque throughout a great part of its extent, and preserve its transparence at a certain point, it is through the part of the iris opposite to this point, that the artificial pupil should be made.

The operation being finished, we lay over the eye some soft lint and a light easy bandage. Should inflammation supervene, it is to be treated by the antiphlogistic method, as in cases of acute ophthalmia.

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## PARACENTESIS.

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### *Paracentesis Abdominis.*

When a great quantity of fluid has accumulated within the peritoneum, where absorption cannot be induced by the administration of medicine, it is necessary to draw it off by the present operation.

However simple this may appear, it is not entirely exempt from danger, since the epigastric artery has occasionally been wounded, and patients have died in consequence.

The patient is seated on the edge of the bed, a little on the side which is to be operated on. If the abdomen be not very much distended, we pass a towel around the body in order to lighten the integuments and force the fluid toward the lower part of the belly. But at what point should the puncture be made? Authors direct us to choose the middle of the space between the umbilicus and the anterior superior spine of the ilium; but in

Following this direction we are not always certain of avoiding the epigastric artery, because the relative situation of the umbilicus is by no means constantly the same in every individual. In consequence of this, LISFRANC advises us to draw a line from the inferior extremity of the ensiform cartilage to the symphysis pubis; at about two-thirds of an inch below the middle of this line, we draw a second, to the anterior superior spine of the ilium. The puncture should be made at the middle of this second line.

It is almost indifferent whether we operate on the right or left side, though the right is most generally preferred, because the great omentum descends lower on the left than on the right side, and the small intestines floating also in greater quantity on the left, we run less risk of wounding them by operating on the right.

The surgeon takes a straight (or even a curved trocar, if he have no other) in his right hand, placing his fore finger on the canula to direct it and limit the depth to which it should be introduced. He tightens the skin with his thumb and finger of the left hand, and when he has placed the point of the instrument where he intends to make the puncture, he pushes the trocar at once through the walls of the belly, and ceases to press as soon as the want of resistance informs him that he has entered the cavity. He then withdraws the trocar and allows the fluid to escape into the vessel intended for its reception. In order to evacuate the abdomen completely, the patient should raise the pelvis, first on one side and then on the other; in a word, he should move the body in every direction which can assist in moving the fluid towards the canula. The compression is also to be gradually increased by means of the towel passed round the body.

If the orifice of the canal is obstructed by a part of the omentum, we introduce a blunt probe through the

canula to push away the obstruction preventing the escape of the fluid. After the whole of the fluid is evacuated, the surgeon takes the canula between the fore finger and thumb of the right hand, and withdraws it slowly, while with the same fingers of the left hand he presses upon the edges of the wound. A soft compress is placed over the opening, and a large flannel roller around the abdomen; for which, muslin or linen may be substituted, when the first is not to be had.

Tapping may also be performed in the following manner:—

The patient being seated in a high chair, and a towel passed round the body, above the umbilicus, we make the puncture through the linea alba, about an inch and a half below the umbilicus. The fluid is evacuated by exerting gradual compression with the towel passed round the belly. In other respects the operation resembles the one above described.

This latter method, most commonly employed in England, is attended by some serious inconveniences: for although we have the advantage of certainly avoiding the epigastrie arteries, we may wound the great arterial trunks which course sometimes along the line. We may pierce the anterior wall of the bladder, as in numerous instances it extends nearly to the umbilicus; moreover, its anterior surface sometimes adheres to the anterior wall of the abdomen. Before performing the operation in this way, we should sound the bladder in every case, in order to ascertain how high it ascends. All these considerations are certainly not in favour of operating on the linea alba, and we only perform it there in those cases in which the tumefaction of the liver or the spleen prevent us from attempting it at the situation first indicated.



*Operation for Empyema.*

Practitioners having had occasion to observe frequently, that wounds penetrating the chest were not constantly followed by mortal accidents, and that a radical cure was effected of the greater part of them, were induced to puncture the chest to evacuate fluids effused within it.

It would not be prudent, nevertheless, to attempt this operation in every case of hydrothorax. If this affection results from an acute inflammation, as pleurisy or pneumonia, or the suppression of any habitual discharge; should the patient be young, robust, and sound in other respects, it is a fit case for the performance of the operation.

The opening ought to be made on the external and superior surface of the chest, between the third and fourth rib, on the left side, and the fourth and fifth on the right, counting from the last lower rib, and at an inch and a half in front of the angle of the ribs. If a tumour filled with serosity, projects between the ribs, we should operate at this point. We do not employ the trocar, which would expose us to the danger of wounding the diaphragm or lungs, and we employ a simple, straight, and narrow bistoury.

*Operation.* The patient being seated upon a bed or chair, the surgeon aided by an assistant, makes over the place we have pointed out, a fold in the integuments, parallel to the axis of the intercostal space, to raise the skin, cellular substance, and edge of the latissimus dorsi, if possible; then he makes on this fold, an incision, two inches long, parallel to the intercostal space. Having made this first incision, he holds the bistoury in the first position, and gently cuts, layer by layer, the intercostal muscles; he then carries the end of his left fore finger under the lower edge of the superior rib, where the opening should be made, to avoid the intercostal

artery, which ordinarily passes along the inferior edge of each rib, except in some anomalous instances, when the artery is divided into two branches, one of which runs along the superior, and the other the inferior edge of the ribs. Then he penetrates through the pleura, which he cuts for the extent of two or three lines, with the point of the instrument, taking care not to go too far forward, for fear of wounding the viscera of the chest. In passing the bistoury through the pleura, the surgeon should be careful not to cut too close to the upper edge of the inferior rib, lest he should open the artery, in case the irregular distribution of it exists. He withdraws the bistoury, and closes the opening accurately, with the flaps or with the finger, then cautiously introduces the canula, without allowing the air to rush into the cavity of the pleura.

Should there be a very large quantity of fluid within the cavity of the chest, we evacuate it partially, and place a compress on the wound, until next day, when we evacuate the rest, in the same manner.

By this means, the compressed lungs gradually return to their natural condition, and we easily avoid the introduction of air into the cavity of the pleura.

Should the collection of fluid exist on both sides of the chest, we perform the operation on both sides separately, but at different times, otherwise the patient may be suffocated, by the introduction of air into both sides at once.

We place a fine square compress over the wound, because flakes of lint might get into the wound; over this we apply a graduated compress and a bandage, or rather a corset or jacket. We remove the dressing, whenever we wish to evacuate more of the fluid, and we dress the wound daily, or oftener, if necessary; in placing the compress we have mentioned, we must be careful not to allow it to get into the chest, through the wound, which often happens, when mere lint is employed to cover it.

### *Tapping the Pericardium.*

In his treatise on Surgical Diseases, **BOYER** observes, that when it is deemed prudent to attempt this operation, Professor **SKIELDERUP**'s method ought to be preferred to all others, as least dangerous. It consists in making a crucial incision on the sternum, removing a part of the bone with a trephine, and puncturing the pericardium. This operation should be performed immediately below the point where the cartilages of the fifth ribs join the sternum. There the two pleura leave between them a triangular space, which constitutes the anterior part of the mediastinum situated more to the left than to the right, and is filled with cellular texture. The apex of this triangular rises as high as the fifth rib, and its base extends to the diaphragm. After having trephined the sternum at the point specified, we may open the pericardium without wounding the pleura. The crown of the trephine used should be of sufficient size to make an opening, which will allow of the introduction of the left fore finger, to serve as a guide to the blade of the bistoury, in piercing the pericardium. The bony circle is strongly fixed internally, by the internal ligaments, so that we are obliged to detach them with the bistoury, after using the trephine.

If any hemorrhage occur, we must suspend the operation until it has ceased. Before making the puncture, the patient should incline the trunk forward. After the evacuation of the fluid, we dress the wound, as after the operation for empyema.

### *Paracentesis or puncture of the Bladder.*

In cases of retention of urine, in which we cannot relieve the patient, nor use the catheter, the bladder be-

comes distended, and if it be not evacuated, the bladder ulcerates or gangrenes, the urine escapes into the cavity of the abdomen, a violent peritonitis comes on, and generally produces the death of the patient; to prevent these consequences, we puncture the bladder.

This operation may be performed in three ways, above the pubis through the perineum, and from the rectum.

1st. Puncture of the bladder above the pubis.—This mode is most employed in France.

The patient lies supine, on the edge of the bed, the thighs being slightly flexed on the pelvis. The surgeon, placed in front of the patient, or on the right side, may see, if the patient be thin, the circumscribed elevation, formed by the distended bladder; he places the fore finger on the point, where he wishes to make the puncture, about an inch above the symphysis pubis, in the linea alba. He then takes a curved trocar in his right hand, placing his fore finger on the canula, to limit the depth of the puncture, which ought to be four or five inches, more or less, according to the corpulence or size of the patient. After having traced out the proper point, he pushes the trocar at once, downwards and forwards, holding its convexity towards the pubis, according to the direction of the axis of the bladder. The want of resistance, and the flow of a small quantity of urine, shows when the trocar has entered the bladder. We then withdraw the trocar with the right hand, while we retain the canula with the thumb and two first fingers of the left hand. The patient is placed on his side, and inclined in such a manner, as to facilitate the flow of urine. It is necessary to push in the canula, in proportion as the bladder empties itself, lest its extremity should escape from this viscus, and allow an effusion of the urine into the abdominal cavity. As soon as the urine is entirely discharged, we stop up the catheter, with a piece of cork; two tapes, passed through the ears of the cathe-

ter, are carried round the pelvis, to retain it in the bladder. As at the end of seven or eight days, concretions may form about its extremity, it is withdrawn, having first replaced it, by means of a gum elastic catheter, introduced through the canal of the first, in the same manner as we would introduce the trocar. The principal objection we can make to this method, is that the canula may escape from the bladder, which may cause an effusion of urine into the cellular tissue; another inconvenience, is the continual presence of this instrument in the bladder.

Mr. ABERNETHY in performing this operation, separates the pyramidal muscles, after having made an incision about three inches long, through the skin and in a line corresponding to the direction of these muscles. By this mode, the bladder is easily perceived, and the trocar is passed into the bladder, as above described. The danger of urinary infiltration into the adjoining cellular substance, is less, because the fluid escapes easily through the external opening.

### *Puncture of the Bladder through the Perineum.*

The patient is placed, as for the lateral operation; an assistant presses on the bladder above the pubis, to force it downwards. The surgeon is placed between the thighs of the patient, kneeling on the right knee, and holding in the right hand, a common bistoury, in the first position; he commences an incision over the raphe, at the same height, and in the same direction, as in the lateral operation; this incision should be about an inch and a half in length. Arrived at the bulb of the urethra, he carries the fore finger of the left hand into the superior angle of the wound, presses upon the bulb, and searches for the prostate gland, and the projection pro-

duced by the distended bladder. He then introduces the trocar, (which ought not to be less than three inches long) into the bladder, towards the left side, and the base of the prostate gland. He withdraws the trocar with the right hand, retains the canula with his left, and empties the bladder. The canula is then removed, and a female catheter introduced in its place, which is secured by means of tapes fixed to the ears of the catheter, and pinned to a bandage round the body.

This method is the most difficult of all; it demands many precautions, an exact knowledge of the disposition of the parts, to avoid the lesion of the vasa deferentia, the seminal vesicles, the ureter, prostate and rectum. Without these precautions, we might pass the trocar between the bladder and rectum, and withdraw it without evacuating the urine.

6d. *Puncture of the bladder from the rectum.*—The patient is placed as for the lateral operation; an assistant presses the bladder downwards by placing his left hand above the pubis, and raises the scrotum with his right. The surgeon, placed as in the preceding operation, introduces the fore finger of his left hand, lubricated with oil or mucilage. He feels behind the prostate for the space which exists between the prostate and the seminal vesicles, which, when found, he keeps his fore finger fixed upon that point, and glides along its palmar surface, a curved trocar from four to five inches long. He plunges it into the bladder in the direction of a line which would terminate at the linea alba between the umbilicus and the pubis. He then withdraws the finger, and the trocar retaining the canula in its place with the thumb and two first fingers of the left hand; the urine is then evacuated. The canula is commonly left a day or two into the bladder, and the urine continues to flow through the wound if the passage be not yet closed.

It is objected against this method, that the seminal



vesicles may be wounded, that the presence of the canula in the rectum and bladder may cause inflammation: moreover, the fecal matters may be forced into the bladder, and form the nucleus of a calculus. In addition, the passage of the urine through the wound produces excoriations in the neighbouring parts, and may cause a recto-vesical fistula.

### *Operation for Hydrocele.*

The patient lying supine upon the edge of the bed or a table, two assistants hold the thighs sufficiently apart; the surgeon takes the tumour in his left hand, so as to press the testicle upwards and backwards at the same time that he presses the fluid towards the anterior and inferior extremity to render this part prominent. Holding then his hydrocele trocar in his right hand, with his fore finger on the canula to limit the depth of the puncture he is to make, he plunges it from below upwards, and slightly oblique from behind forwards, through the parts rendered prominent by the pressure. The want of resistance, and the flow of some drops of fluid along the opening made by the trocar, informs us when the instrument has entered the cavity of the tunica vaginalis. We then withdraw the trocar with the right hand, and the canula is kept in its place with the left hand to evacuate the fluid. We press lightly on the scrotum to facilitate the discharge, taking care to avoid wounding the testicle with the end of the canula.

When the tumour is evacuated, an assistant adapts the canula of the trocar to the spout of a syringe, holding a half pint of port wine and water, and throws this liquid into the tunica vaginalis, and the surgeon applies his thumb over the opening of the canula, which he sustains with other hand to keep the wine in the tunica vaginalis during the lapse of two or three minutes, in order to cause a slight degree of irritation on the surface

of this membrane. He allows the wine to escape at the end of this time; he makes a second injection in the same manner; and a third, after a similar lapse of time. When the tunica vaginalis is distended with the warm wine, the patient complains of a violent pain, as if the testicle was strongly compressed; but the practitioner aware that this pain will not be less during the operation, must not be intimidated at the patient's fainting occasionally during the injections.

The canula is withdrawn when the tunica vaginalis is entirely evacuated, and we cover up the scrotum with compresses wrung out of the fluid used for the injection.

At the end of two days inflammation appears: we replace the compresses soaked in wine by emollient cataplasms, and then by compresses soaked in some emollient liquid, and the testicle recovers its proper size after the 24th day, if the operation succeeds.

If both testicles are simultaneously affected, we do not operate on the second until the first is cured. If the operation by injection be contra indicated, we open the tumour from above downwards with a bistoury, to allow the water to escape, and place some lint in the wound to cause the irritation necessary to procure the adhesion of the parts.

### *Paracentesis of the globe of the Eye.*

The circumstances which demand this operation are hydrophthalmia, or a purulent collection in the cavities of this organ or a staphyloma. We should never resort to the operation as long as there is any hope of preserving the eye.

During a long time, fluids morbidly secreted within the globe of the eye were evacuated by performing the paracentesis with a small trocar which was passed through the sclerotica at two lines from its union with the cornea.

This method is bad, and should be rejected: it has been displaced by the following operation, with the intention of completely evacuating the globe of the eye without fearing the recurrence of the disease, which frequently happens when we treat a simple dropsy, by cutting the transparent cornea, as in the operation for extracting the cataract; but we must carefully remove the flap to prevent its re-adhesion. We may also make in the cornea a crucial incision with the point of a lancet.

SCARPA describes his method in the following manner:

"The patient being seated, I direct an assistant to fix the head properly, then with a knife like that used in extracting the cataract, I traverse the staphyloma from one part to the other at a line and a half or two lines from the centre of the apex of the tumour, in the direction from the external to the internal angle of the eye, and by gliding this instrument in the direction indicated for the extraction of the cataract. I cut semi-circularly, and below the point of the tumour, remove the segment with forceps, and turning the edge of the instrument upwards, finish by cutting the summit off circularly, so that the portion removed shall be three or four lines in diameter, according to the size of the tumour."

This may be used in cases of hydrophthalmia and hyopion.

The eye being emptied, the tunics collapse, and produce a moveable stump, on which we may adapt an artificial eye, in the manner heretofore indicated.

No application is necessary but the lids themselves; if inflammation comes on we lessen it by leeches and emollient cataplasms, applied over the outside of the lids.

### *Paracentesis of the Membrana Tympani.*

This operation was first performed by ASTLEY COOPER, for the cure of deafness produced by an obliteration

of the eustachian tube. It has since been repeated with success in many other cases of loss of hearing.

The patient being placed in a strong light, before a window, his head is to be inclined to the side opposed to that on which the operation is to be performed, and supported against the breast of an assistant, in such a position as to permit the rays of light to pass freely to the bottom of the auditory canal. The assistant is to steady the patient's head by means of one hand applied to the forehead, whilst with the other he raises the ear, in order to overcome the curvature of the cartilaginous portion of the canal. The puncture of the membrane is performed with a very delicate and slightly curved trocar, the blade of which should not be more than one line in breadth, or capable of passing more than a line and a quarter beyond the extremity of the canula; this instrument is to be passed with great care along the inferior side of the auditory canal, taking care to keep the concave part of it lowermost; when it touches the *membrana tympani*, the canula is to be held firmly between the thumb and index finger of the left hand, and the trocar pushed out with the right, so as to pierce the membrane at its inferior and anterior part; by perforating it in this spot, the *chorda tympani*, and the handle of the *malleus* are avoided. This operation requires no dressing, but it is advisable to place a square compress of silk over the external opening of the ear, that the patient may not be inconvenienced by noise, a circumstance which sometimes happens in the cure of a deafness which has existed for a long time.

*Perforation of the Maxillary Sinus, to evacuate morbid accumulation of fluids.*

This operation is similar to that already pointed out, for the extraction of polypi from the maxillary sinus. (See page 110.)

## FISTULÆ.

*Operation for Fistula Lachrymalis.*

[METHOD OF J. L. PETIT MODIFIED.]

The instruments for this operation are, a straight bistoury with a narrow but firm blade, a flexible silver stylet, a common grooved director, strong unwaxed thread, a seton, or rather a cord formed of several cotton threads, which must be progressively augmented in size.

These being at hand, the patient is to be seated opposite a window, with his head resting against the breast of an assistant. If the operation is to be performed on the left side, the surgeon in front of the patient is to place the index finger of his left hand on the internal angle of the orbit of the eye, and the thumb on the external, in order to stretch the eyelids, and thus render the tendon of the orbicular muscle more prominent; then passing the index finger of his right hand along the inferior edge of the orbit from the external to the internal angle, he will ascertain the exact situation of the superior orifice of the nasal canal. Mr. LISFRANC has observed, with great truth, that the tendon of the orbicular muscle is not a sufficient guide in finding this canal, although most writers have designated it as such; for in subjects where the base of the nose is large, the internal angle of the eyelid encroaches on the nasal process of the maxillary bone, and consequently the tendon is attached entirely to this bone; in such cases it would be useless to search for the lachrymal canal under it, as it is placed exteriorly. If, on the contrary, the base of

the nose be narrow, the tendon of the orbicular muscle runs some distance past the prominence alluded to above, and the nasal duct will be found interior to the extremity of the tendon—hence it is by no means a sure guide, and the mode indicated by Mr. LISFRANC is decidedly to be preferred. The exact spot for the incision being thus ascertained, and the fingers of the operator placed in the position already indicated, he is to pierce the skin in a perpendicular direction until he is warned by the want of resistance, that the knife has reached the nasal duct; in doing this, it is to be held in the first position, with the edge directed to the nose; the handle is now to be raised and carried towards the internal angle of the eye, until the point penetrates the duct; this movement will be sufficient to form an incision of about three lines, of which the direction should be obliquely downwards and outwards. The bistoury is then to be inclined slightly outwards, and a small grooved and probe-pointed stylet passed along its back in order to clear the canal; the knife is now to be withdrawn, and the stylet pushed down till it reaches the inferior meatus of the nasal fossa; this may be ascertained by the sensation of tickling it produces, or by the flow of a small quantity of blood from the nose.—This stylet, or sound, serves as a director for a second stylet of thin and flexible silver, to the superior extremity of which, is fastened an unwaxed thread. The sound is to be withdrawn as soon as this stylet reaches the nostril,—a common grooved director, introduced into the nostril, will serve to conduct the inferior extremity of the stylet, which, from its flexibility will easily bend on meeting with this obstacle, and may be then seized with a pair of forceps and drawn out through the nostril, bringing with it the attached thread.—Such is the method indicated by the ingenious editors of the “*Medicine Opératoire*” of Sabatier.



This being done, a dossil of lint or cotton is to be attached to the inferior extremity of the thread, and drawn up till its superior portion is fixed in the lachrymal sac, taking care, however, that it does not enter the outer incision—a thread is also to be fastened to the lower part of this dossil, in order to remove it when required. The operation being finished, the superior thread is to be fastened by twisting it round a pin attached to the cap of the patient, whilst the inferior one is clipped off close to the nostrils. The wound is to be dressed with a small pledget of fine lint, secured in its place with a strip of adhesive plaster. The size of the seton at first, to be composed of a few threads of lint or cotton must be gradually augmented in order to dilate the canal; this treatment must be continued for several months, and in some cases for years, as the seton must not be relinquished till one of the size of a goose quill can be easily introduced; after removing the seton it is better to leave the thread in the wound for a few days in order to renew the seton in case the tears do not take their natural course.

[ANOTHER METHOD OF INTRODUCING THE SETON.]

After having cleared the nasal canal by means of the probe-pointed stylet, this same instrument will serve as a director in introducing a canula, either of silver or lead, about eighteen lines in length, and of a diameter proportionate to the age of the patient; this canula is to be slightly curved to fit the direction of the nasal canal; an elastic stylet, made of a watch spring, and terminated by a small bulb of gold or silver, and pierced at its superior extremity with a hole, is to be introduced through the canula; owing to the elasticity of this stylet, it readily passes out at the nostril; a linen thread is to be passed through the eye at the upper extremity, and the

stylet and canula withdrawn. The after mode of procedure is similar to that above mentioned.

Some surgeons prefer a leaden tent, or a piece of catgut, instead of the seton; but this practice is not generally followed.

[METHOD OF DUPUYTREN.]

The patient being placed, and the lachrymal sac opened, as has already been described, the operator is to introduce a small punch inclosed in a gold canula, of the form and length of the lachrymal canal; to effect this, the blade of the bistoury is gently to be raised, whilst at the same time the punch is pushed down; to keep the canula from slipping off the punch, the surgeon should maintain it in its place by placing the index finger of his hand on the small rim with which it is furnished; the bistoury is now to be withdrawn and the punch forced into the nasal canal, which the canula should completely fill in such a manner, that the rim engaged in the lachrymal sac is entirely covered by the lips of the external incision. The punch is now withdrawn, and the canula is kept in its place by pressing it down with the index finger. The patient must be ordered to make a strong expiration with his mouth and nostrils closed, the blood escaping at the superior orifice of the wound will prove that the instrument is properly placed, and that the communication between the nasal fossa and the lachrymal sac again restored. The wound is to be dressed with a small piece of court plaster; cicatrization will readily take place.

This mode is evidently the best of all hitherto indicated; the worst consequence that can arise from it is the irritation which the canula may produce, even in such cases which are, however, rare; it answers the purpose of the seton, the leaden tent, or the catgut, and it

can readily be withdrawn by means of a slight incision over the rim, and a wire introduced into the canula.

[METOD OF SCARPA.]

When fistula lachrymalis cannot be cured by dilating the nasal canal, SCARPA advises that a route for the tears be afforded by perforating the *os unguis* in the following manner:

The patient being seated in a chair opposite a window, with his head resting against the breast of an assistant, the operator is to make a transverse incision of a few lines in length, with a common straight bistoury, over the external side of the lachrymal sac; the wound is to be filled with lint for forty to forty-eight hours; after this it is withdrawn; a silver canula is to be introduced through the opening to the *os unguis*, through which an iron stylet, heated to a white heat, is to be passed; this perforates it at once, as well as its lining membranes. By this means, a real internal fistula is substituted for the morbid external one, and the tears flow freely through it, particularly if it be made downwards and towards the lower end of the sac.

Striking as this method may appear, it does not offer all the advantages that may be supposed, as nothing is more common than a return of the disease after such an operation.

*Fistula of the Parotid Gland.*

This disease is the almost inevitable result of an opening in the duct of Steno, whether produced by an abscess, by gangrene, or a wound. The great aim in the treatment is to re-establish the passage of the saliva from the gland to the mouth, either by clearing the natural passage, by making an artificial duct by means of a

seton, or by using such compression either on the duct, between the fistula and the gland or on the gland itself, as will paralyse it, and thus hinder the secretion of saliva.

If the seton be resorted to, the patient is to be seated in a chair, with his head resting against the breast of an assistant; the surgeon is to introduce into the fistula a small trocar, such as is used in hydrocele; this is to be passed obliquely from below inwards, in the direction of the salivary duct. The blade of the trocar is now to be withdrawn, and a linen thread passed through the canula into the mouth; to this thread is to be fastened a small seton of lint or cotton, after which, the canula is to be removed, and the seton drawn into the new opening, taking care, however, that it does not interfere with the lips of the external wound, through which the thread only should pass; this is to be fixed to the cheek by means of a strip of adhesive plaster. The seton is to be renewed every day, and enlarged by the addition of a few threads of lint. The wound is to be dressed with lint, retained in its place by a compress and bandage, or by small strips of adhesive plaster. After a few weeks, if the seton passes easily and without giving pain, it may be laid aside; the thread must, however, remain for four or five days longer; if the operation be successful, the external wound will heal readily, and the saliva pass freely into the mouth. During the time of treatment the patient keeps his jaws in a state of absolute rest.

#### [BY CAUTERISATION.]

The external opening is to be touched with nitrate of silver, the eschar produced is to be covered with a piece of adhesive plaster. The saliva being thus prevented from passing externally, forms for itself a passage into

the mouth; to prevent the eschar from drying too quickly, it should be occasionally moistened by the application of compresses wet with some emollient liquor. This method, although extolled and practised by LOUIS, is attended with several objections; the disease is apt to return on the eschar being detached, and also in leaving a large and ugly scar in the middle of the cheek.

The two methods we have indicated are, nevertheless, preferable to the use of a temporary canula, to serve as a passage for the saliva, as some surgeons have proposed; we therefore shall not attempt to describe this mode.

### *Operation for Ranula.*

This disease is a tumour formed under the tongue, by a collection of thickened saliva in the salivary ducts of Wharton. The method of cure consists in opening this tumour and preventing a reaccumulation of the fluid.

“MR. DUPUYTREN proposed many years since, to keep open the incision made in the tumour, by placing between the lips of the wound, some substance which could remain there always. The instrument which he constructed to fulfil this indication, consists of a rounded piece of either gold, silver, or platina, about four lines in length and about four in breadth, having at each of its extremities an oval plate, slightly convex on one side, and concave on the other; one of these little plates is to be introduced into the tumour, whilst the other remains in the cavity of the mouth. Instead of this instrument, Mr. DUPUYTREN at first made use of a double canula, but he relinquished it, as he found that the food was apt to choke the opening of the instrument, and that the saliva passed between the canula and the lips of the wound.

"The opening into the tumour having been made, by puncturing it, or if it be large, by an incision, Mr. DUPUYTREN permits the contained fluid to escape, and waits before fixing the above described instrument, until by the contraction of the tumour, the orifice is merely sufficient to permit the passage of it. This mode of treatment has constantly been followed with success; it is simple and easily employed, and the patient is not in the least inconvenienced by it, after wearing it for a few days." (SABATIER *Medicine Opératoire*, edition of Sanson and Bégen.)

### *Fistula in Ano.*

This disease may be divided into those which ought not, and those which are to be cured; and those that may, or may not be cured without inconvenience. The first are those accompanied with chronic inflammation of the abdomen or thorax; the second, those which are callous, and secrete so much matter as to exhaust the patient and place his life in danger; the latter are those which are not callous, and pour out but little matter.

In this operation the patient is to be laid on his face or side, and the surgeon is to ascertain whether the fistula is complete; that is, open at both extremities: to do this, a grooved staff is to be introduced through the external opening, to the rectum; if the internal orifice be not too deeply situated it may be passed out at the anus. In such a case, the point of a strong and straight knife is then to be inserted in the groove of the staff, and an incision made from without inwards, by raising the handle of the knife, the point serving as a fulcrum in the groove of the staff. But if the internal orifice of the fistula be deeply situated, it is impossible to pass the extremity of the director through the anus; in such cases a gorget of box-wood or ebony is to be passed into the



rectum, having previously, however, warmed and rubbed it with simple cerate; the concavity of this instrument is to be turned towards the orifice of the fistula; a grooved director is then to be introduced through the external orifice of the sinus, and pushed on till its extremity comes in immediate contact with the concave face of the gorget; an incision is then to be made along the director from without, inwards, till the knife meets the gorget, these two instruments are then to be withdrawn together, forming necessarily a greater or less angle.

When an occult internal fistula, that is a fistula which opens only into the rectum is to be operated on, the index finger of the left hand previously smeared with oil or mucilage is to be introduced into the rectum, till the orifice of the fistula be felt. With the right hand, a staff is to be passed along this finger till the point penetrates the orifice of the sinus; withdrawing the finger, the sound is to be pushed along the fistula till it raises the skin exteriorly; a transverse incision is then to be made directly over it, so as to expose the extremity of the sound, and thus to convert an incomplete into a complete fistula. The operation after this, is to be performed as in the preceding case.

The operation being finished, it is to be dressed, by introducing either a dossil of lint between the lips of the wound, or a simple strip of linen; a few days afterwards it is to be dressed with pledgets of lint secured by compresses and a T bandage. Some surgeons close the wound at once, and apply strips of adhesive plaster that it may heal by the first intention. If the hemorrhage is great, the wound is filled with lint; opening the fistula by the knife is much preferable to passing a leaden wire through the fistula, so that the two ends may be twisted together and gradually tightened, for perhaps twenty days, in order that it may slowly ulcerate a pas-

sage through; it is only to be used in those cases where a patient will not submit to the knife: it is, however, an almost certain method, when executed with proper skill.

If sinuses exist above the coccyx or thighs, they are to be opened with a bistoury.

### *Recto-vaginal Fistula.*

This fistula may be known by the passage of feces from the rectum into the vagina; it is rarely that a cure of it has been effected; nevertheless, Mr. DUPUYTREN has accomplished it by the following method:

The patient is to be laid on her back at the edge of a bed, with her thighs apart and flexed on the pelvis; the surgeon standing between them is to introduce with the right hand a speculum ani, in order that the orifice of the fistula may be viewed; then taking the handle of the speculum in his left hand, he cauterises the orifice of the fistula with nitrate of silver; an eschar will be formed and slough off, the inflammation which supervenes, tends to unite the edges of the sinus and cicatrization sometimes takes place; the caustic must be used several times, as one application will never suffice.

### *Vesico-vaginal and Urethro-vaginal.*

This has sometimes been cured by the use of catheters, but the safest mode is to cauterise them, according to the method we are about to explain.

### *Urinary Fistula.*

*Method of Mr. Ducamp.* "It has generally been supposed in France," says Mr. DUCAMP, "that an urinary fistula is only to be cured by leaving a catheter in the bladder, which, in giving issue to the urine, at the same

time prevents its passing by the fistulous opening: He advises, if there exist a stricture anterior to the fistula, which obstructs the flow of the urine, and forces it to pass by the morbid opening, to destroy it by the method we shall indicate in treating of strictures of the urethra.

“A catheter permitted to remain permanently in the urethra,” observes this ingenious author, “hinders the cicatrization of the fistula; 1st. because it irritates and inflames the canal, and the morbid opening which exists. 2d. It causes a great secretion of mucus, which constantly bathes the wound, and by this superfluous moisture retards the cure; 3d. The catheter acts on the fistula, as a pea does in an issue. These inconveniences are to be obviated, by not permitting the catheter to remain permanently in the urethra, and the desired effect is answered: namely, that the urine should not pass by the fistulous opening, by introducing a gum elastic catheter whenever the patient wishes to urinate.

In those cases where the urine passes freely by the fistula, and not by the meatus urinarius, the canal of the urethra anterior to the fistula is often completely obstructed by the cicatrization of the anterior portion of the fistula. Instead of destroying this obstruction by a trocar introduced into the urethra, as advised by some surgeons, or of passing a sound and cutting on its point the parts which form the obstacle in order that it may be pushed onwards to the bladder, Mr. DUCAMP is of opinion that the desired effect may with more certainty be produced by means of the armed bougie of HUNTER. This is a wax bougie, to one extremity of which a small portion of nitrate of silver is attached, in such a way that the extremity only of the caustic is to be seen. In making use of it, a common wax bougie, of the same size as the armed one, is to be passed into the urethra; when it arrives at the obstruction, a mark is to be made with the nail to ascertain its distance from the mouth of

the urethra; this is to be likewise marked on the armed bougie, in order to show the distance it must pass before reaching the obstruction; it is then to be introduced, having been previously well lubricated with oil, and when from the resistance opposed to its further passage, and the mark indicate that it is pressing against the stricture, it is to remain for twenty or thirty seconds in this position, at the same time a slight pressure is to be made against the obstruction; it may then be withdrawn. This operation must be repeated every two or three days until the obstacle to its further passage be entirely removed. A large bougie is then to be introduced, and suffered to remain for a few days, when it will be found that the canal is re-established, and that the urine ceases passing by the morbid opening: if the cure of the fistula is then to be conducted according to the rules already laid down, cicatrization will speedily take place. The use of the armed bougie is nevertheless dangerous, and should only be resorted to in urgent cases.

### *Treatment of Strictures of the Urethra.*

*Method of Mr. Ducamp.* To destroy the morbid disposition of the parts which form the obstruction, and to render this part of the canal as level as the rest, are the double indications purposed by Mr. DUCAMP, whose plan we will briefly explain.

Lunar caustic is the agent he makes use of to fulfil the first indication; but his method of using it is perfectly new.

This caustic, to be employed to the greatest advantage, should touch the stricture alone, and thus only destroy the part which forms the obstruction to the flow of the urine; hence, before using this substance, the exact situation and extent of the stricture should be as-

certained; to do this, a model or impression of the stricture is to be obtained by means of what the author terms an "explorative sound." "I use," says he, "for this purpose, a hollow bougie of gum elastic, No. 6, upon which the divisions of a foot measure are marked; in introducing this bougie, I can at once perceive to what distance it passes into the urethra, and when it is arrested, the exact number of inches and lines the stricture is from the meatus. Having noted this with care, I immediately seek for further information; that is the exact situation of the opening in the stricture; to accomplish this, I make use of catheters, No. 8, 9, 10, open at both ends, and upon which the divisions of a foot are likewise marked; the anterior opening of these catheters ought to be one half greater than the other. I take a piece of flat tapestry silk, in which I make several knots, that I dip in melted wax, which I then make round. I pass this silk by means of a string, through the catheter, commencing at the larger end; on reaching the other end, the ball formed by the knots covered with wax is arrested whilst the silk itself passes through, and forms at the extremity of the catheter a strong and fine downy tuft. This tuft I dip in a mixture of equal parts of yellow wax, diachylon, shoemaker's wax, and rosin; of this mixture I apply as much to the tuft of silk as will render it the same size as the catheter, I then permit this wax to harden, after which I mould it with my fingers, and then roll it on a polished surface. I cut this species of bougie added to the gum elastic catheter about two lines from the latter, and mould the wax into the form of the extremity of a sound. I pass one of these sounds into the urethra; when it reaches the stricture, I permit it to remain for a few moments, in order that the wax may become warmed and softened, after which I again push it forward; the wax finding itself pressed between the sound

and the stricture, fills all the depressions of this latter and enters the opening, taking an impression of the shape it presents. If the morsel of wax which has entered the stricture is in the centre of the mass of the same material which terminates the sound, I know that the projecting parts which form the obstacle are equally distributed around the opening, and that the whole circumference must be cauterised. If the projecting portion is on the upper part, the stricture to be removed is situated at the inferior part of the canal; if, on the contrary, it be on the inferior portion, the caustic must be applied to the superior part of the canal; the same is to be observed as regards the sides. The same wax can be made use of several times, by remoulding it."

Having obtained the necessary information respecting the situation and shape of the stricture, its length must be ascertained. To accomplish this, several threads of flat silk must be taken, which are to be dipped in the above melted wax; they are then to be twisted round a bougie, and the whole rolled between two polished and flat bodies. The bougie, thus prepared, is to be passed into the urethra, and permitted to remain for a short time; when it is withdrawn, it will be found to have received an exact impress of the extent and shape of the stricture. This mode of ascertaining the size of a stricture is only applicable to those cases where a bougie can be passed through the obstruction. To introduce a bougie in those difficult cases, which have so often baffled the best surgeons, an instrument termed a conductor has been made use of; this is a gum elastic catheter open at both ends, which, as in all the instruments made use of by our author, is marked with a scale to indicate the depth to which it can be passed: this instrument is to be passed to the stricture, and when the opening is in the centre of this latter, it will correspond to that in the conductor.

When it is above, below, or on one of the sides, ano-



ther conductor is used, furnished with an eminence or enlargement on one of its sides near the extremity; this eminence being turned to the lower part of the urethra, if the opening in the stricture be situated above and *vice versa*; by this means the opening in the conducting catheter can always be made to correspond with that of the stricture, so that a bougie introduced through the catheter passes the opening of the stricture with great ease; we are thus enabled to direct the point of the bougie at will, to any point of the obstruction in which an opening may exist, and then introduction becomes simple and easy. Having thus acquired a perfect knowledge of the nature of the obstacle, Mr. DUCAMP applies the caustic to it with precision and confidence, by means of an instrument he terms Port-caustic.

This instrument is composed of a very flexible gum elastic catheter, No. 7 or 8, of about eight lines in length, and a tube or socket of platina of eleven lines in length, and of the same diameter as the catheter. This tube is furnished on the outside, at about four lines from one extremity, with a female screw, by means of which it can be adapted firmly to the catheter; at the other end is another screw of about two lines and a half in extent, upon which is fixed a small capsule rounded at its anterior extremity and pierced in the centre, in order to give passage to a bougie. The interior of the tube presents two projecting ridges, which occupy about half its circumference, and run from one extremity to the other, leaving between, on each side, and diametrically opposed to each other, a hollow space or channel. A cylinder of platina of ten lines in length and one in diameter, attached to a gum elastic bougie of eight inches and a half long, completes the instrument; this platina cylinder is furnished at about five lines from its anterior extremity, with a pin, which projects about a quarter of a line; at about half a line below this pin is a deep groove of three lines in length, and three

quarters of a line wide. When the bougie contained in the catheter is pushed forward, the little cylinder of platina projects beyond the tube or socket, and the groove for receiving the caustic becomes visible, its superior extremity being on a line with, and even a little covered by the platina tube which terminates the bougie. The capsule of platina being three lines in diameter, cannot enter the stricture, but must press against its anterior surface, whilst the small platina cylinder can enter the opening and apply to it the three lines of caustic, which may be directed to any part of the opening, so that the whole extent of it or merely a portion of its circumference can be cauterised, by making a greater or less revolution with the bougie.

By taking a mould of the stricture after the fall of each eschar, it will immediately be evident to what part the caustic is again to be applied; by this mode of proceeding, the stricture is cauterised in its whole extent, and destroyed in the most favourable direction for the enlargement of its caliber, from within outwards: sometimes two applications are sufficient, but in general three are required; it is rare that a fourth is necessary, although Mr. DUCAMP only employs about half a grain of nitrate of silver at each operation. The applications of the caustic should be at about three days interval permitting it to remain in contact with the stricture about a minute at each application. Caustic must not be made use of if there is any inflammation of the part, and no force must be exerted in passing the bougie.

The stricture being destroyed, the great object is to obtain a cicatrix of the the same size as the canal, when in a healthy state, namely, about four lines in diameter. Mr. DUCAMP fulfils this indication, by means of two instruments, one of which he terms a *dilator*, and the other a bellied *bougie*. There are three kinds of dilators, the first and second are formed of the verniform process of the cœcum, and the third with a cat-gut.

These articles being properly prepared and cleaned, are used in the following manner: a piece of the gut, about twenty lines in length, is pulled over a small silver staff, terminated with a rounded head, the closed end of the gut being properly extended on the head of the staff, is tied below the head, with a silk thread. This staff is then passed into a canula of the same metal, of eight or nine inches long, having at its anterior extremity, a deep groove, in which the open extremity of the gut is to be firmly tied with the silk thread. The silver canula has a rim, furnished with a female screw at its extremity; the silver should extend to a small distance beyond this rim, and not exactly fill up the cavity of the canula. This instrument is about the size of a bougie, No. 2, when it is empty, and three lines in diameter, when it is full. The third dilator, made with the gut of a cat, of four lines and a half in diameter, is prepared in the same way.

The manner of using these dilators is;—having taken a mould of the stricture, the dilator is to be moistened, lubricated with oil, and introduced like a sound, without using any violence; then a syringe, furnished with a stop cock, is to be adapted, by means of a screw, to the rim of the canula, and air gently forced into it, till some resistance is experienced; the stop cock is now turned, and a syringe filled with water, and again fixed to the canula, and water forced into the dilator, to supply the place of the air; by this means, a greater degree of distension is produced, than if air alone were used; the instrument thus filled, remains for some time; on opening the stop cock, the water will escape, and the instrument may be withdrawn, with great facility.

But the best method is to use the bellied bougie.—The strictured part of the urethra, being the only spot that it is necessary to enlarge, if this can be accomplished alone, the patient will escape much unnecessary

pain, and the cure be much hastened: the bougies hitherto made use of, do not fulfil this end. Mr. DUCAMP has, however, lately invented gum elastic bougies, which present near their extremities, a swelling or enlargement of twelve to fifteen lines long, and from two lines and a half, to four lines in diameter, whilst the uniform size of the rest of the instrument is only two lines; with these bougies, the strictured part can be enlarged to the size we wish, without implicating any other portion of the canal.

The following will show the manner, in which Mr. DUCAMP makes use of them.

“Three days after the application of the nitrate of silver,” says Mr. DUCAMP, “I introduce a dilator of three lines in diameter; I fill it with air, and permit it to remain for five minutes; the next day, I introduce the same dilator, and distend it as much as possible, with water, which I permit to escape at the end of ten minutes, and replace it by a bellied bougie of two lines and a half in diameter, which is permitted to remain twenty minutes; this bougie is again used on the following day, for the same length of time, in the morning and evening; the next day I pass a second dilator of about four lines in diameter, which is withdrawn in ten minutes, and replaced by a bellied bougie, of three lines in diameter. This bougie is used the next day, in the morning and evening, for fifteen or twenty minutes; I make a fresh dilation with the same dilator, on the day following; two days afterwards, I pass a third dilator of four lines and a half in diameter, and replace it by a bellied bougie of three lines and a half; two days afterwards, I renew the use of the same dilator, and pass a bellied bougie of four lines in diameter, which is permitted to remain a quarter of an hour, night and morning; at the end of a week, the bougie is only introduced once, and kept in but a few minutes, four or five days afterwards, the patient

is to introduce it once a day, and withdraw it immediately; by this time, in all probability, the cicatrix will be formed, and of four lines in diameter, as the rest of the uretha.”\*

[METHOD OF MR. DUPUYTREN.]

This professor introduces a gum elastic bougie, until it is in contact with the stricture; it is now secured by the method heretofore indicated. At the end of some time, the presence of a foreign body determines a mucous secretion, the tissues relax, and the bougie gradually overcomes the obstruction. The continuity of the canal being re-established, a sound is passed, which is permitted to remain till the canal is sufficiently dilated. A long experience has proved that in most cases, the course of the urine can be restored by this method, at least, in those cases, where there is no unnatural desire to urinate, and when it is performed according to the rules laid down in the article *Paracentesis of the bladder*.

\* All the elastic bougies invented by DUCAMP, as well as most of the improved French instruments, may now be obtained of Mr. JOHN RORER, in Arch street, Philadelphia. It is but justice to say of this enterprising artist, that the cutting instruments he manufactures are not excelled, nor indeed are they often equalled, by those of any other workman in America, either for excellence and durability of temper or high finish. Having during the last five years, been very much in the habit of practically comparing his dissecting knives, and with those of a great variety of manufacturers, I can speak of them with full conviction, that they will allow of any degree of commendation.—J. D. G.

## H E R N I A

*Reduction of Inguinal Hernia.*

By taxis is to be understood, that operation which consists in replacing any viscus, which has escaped from the abdomen. In order that this operation may be perfectly understood, it is necessary to bear in mind the structure of the inguinal canal. This canal follows the direction of a line, which commencing at the spine of the pubis, would pass an inch and a half within the anterior superior spinous process of the ilium of that side. This direction being known, the hernia is to be reduced in the following manner. The patient is to be laid on his back, having his thighs flexed on the pelvis, and his head flexed on his breast: if these are extended, they would cause a tightening of the tendinous aponeurosis, and consequently contract the opening of the canal; some surgeons however, prefer placing the patient in a standing posture.

The tumour is to be grasped with both hands, and compressed laterally, and not in the direction of its length, or of its base, and always in the course of the canal we have described; for if the base of the tumour be compressed, its bulk will be augmented, the reduction rendered more difficult; the same will take place, if the pressure be not made in the direction of the canal; it is to be pushed through the ring, with the index finger, beginning with those parts which are in contact with it.

The hernia being reduced, it is retained in its proper place, by a spica bandage, or what is better, by a truss or elastic bandage, the size of which must be accurately adapted to the part; it is applied as follows:—



The patient must retain the visera in the abdomen; by placing his hand over the inguinal ring; the surgeon then places the pad over the opening, and tightens the truss, by fastening the leather band to the hooks or buttons on the pad, taking care that the skin under the truss be not thrown into folds. The patient should be made to cough; and use some exertions, in different positions, in order that it be observed, whether the hernia perfectly keeps in its place; the use of the truss should be continued without intermission, till a perfect cure is effected, otherwise the disease will return.

### *Operation for Inguinal Hernia.*

When the parts concerned in the hernia, are found to be compressed to such a degree, by the inguinal ring, that strangulation takes place, reduction must not be resorted to; and if an operation be not speedily performed, in order to overcome this stangulation, inflammation will take place, and the most fatal consequences ensue. Before resorting to an operation, reduction must always be attempted, and it is only when foiled by a reiteration of useless trials, that the former must be executed. This is done as follows: the patient is laid on the right side of a bed, or on a table, covered with a mattress and pillow; the assistants placed at the head and feet of the patient, secure them firmly; the surgeon placed at the right of the patient, on which ever side the hernia may be, pinches up the skin which covers the inguinal ring, with the thumb and index finger of his left hand; this is also done by one of the assistants, so as to form a fold, in an oblique direction, crossing the inguinal canal at right angles. The surgeon now holding a curved bistoury in the fifth position, divides the fold from the middle to the base; he then enlarges the incision; the assistant raising the internal, whilst he

himself manages the external lip of the wound: any artery that is cut, should be immediately tied, as if they were neglected, until the operation be finished, then retraction would render it difficult; an assistant sponges the wound after every cut of the knife, that the parts may be clearly perceived.

The incision through the skin being made, that of the hernial sac is next to be undertaken: the operator still holding the bistoury in the same way, must cut with great precaution, and layer by layer, for fear of injuring the intestine, if it is an enterocele, or the epiploon, if it should be an epiplocele; an injury of the latter is, however, much less dangerous, than that of the former. The tissues, which form the sac, should not be raised by means of forceps, and then divided by curved scissors, as some surgeons have advised, as by this method, the intestine itself may be raised and cut. To enlarge the opening of the sac, instead of dividing the membranes on a grooved staff, it is better to use the index finger of the left hand: as a director, in such case, the bistoury should be probe pointed and very narrow.

The hernial sac being opened, and the parts contained in it exposed to view, the next object is to free the intestine: this part of the operation consists in enlarging the opening of the inguinal ring. The question now arises, whether the division should be made on the outer or inner side of the gut? It has been asserted, that when the hernia takes place directly through the inguinal ring, that the epigastric artery is always situated on the inner side of the tumour; in this case, SCARPA advises that the incision should be made on the outer side, but if it escapes on the internal side of the canal, the artery will be found on the outside. SCARPA here advises the cut to be made on the inner side; this latter mode, it is true, is very rare, but it is said that it may always be distinguished by its descending vertically, whereas, in

the former case, it follows the obliquity of the canal. But these principles are erroneous; it being impossible to distinguish, if an inguinal hernia is interior or exterior to the artery; and consequently, the direction on the inner or outer side, is not certain, and exposes us to the danger of cutting the artery, and should therefore be rejected. The proper method is to cut directly above, between the pillars, for in such a case, the epigastric artery will recede before the knife, as is always the case, when it is applied in the longitudinal direction of the blood vessel.

A probe pointed bistoury is to be made use of, in this part of the operation, but no staff or director; the bistoury is to be introduced into the ring on the index finger of the left hand, taking care that its point does not project beyond the end of the finger; by this means the opening is closed, the intestine prevented from coming in contact with the edge of the knife; a slight but distinct sound, and feeling that the resistance is overcome, will give notice that the operation has been successful. The extent of the incision should be three lines at the most, otherwise the inguinal ring will, in all probability, be so much weakened, that the patient will be subject to a return of his complaint, to a greater degree than that which it has been attempted to relieve.

Instead of the common probe pointed bistoury, it is better to use the bistoury of ASTLEY COOPER: this instrument has the blade terminated, by an oval button, and is only furnished with a cutting edge, of about four lines in length, at about an inch from the extremity of the blade; this bistoury can be insinuated with great ease, between the intestine and the superior angle of the ring, without the fear of cutting the former. By cutting directly upwards, as we have already observed, a sawing motion with the knife, must be avoided, as this method would in all probability, cause a wound of the artery,

but the bistoury must be merely pressed directly upwards; by this means, it will divide any substance that offers a firm resistance, while the spermatic chord and blood vessels will not be injured by it.

The ring being divided, the epiploon or intestine that has been strangulated is to be drawn out and examined, to ascertain if gangrene has taken place, or whether any stricture exists, capable of opposing the passage of the fæces.

If this be found in a sound state, the next object is to reduce the tumour; in doing this, the fingers should be oiled, and the same rules observed, as have already been premised; but if on the contrary, the strangulated portion has become gangrenous, which may be known by its purplish gray colour, or is much contracted, a complete division of the whole tube is to be made; thus establishing an artificial anus, as is the case in penetrating wounds of the abdomen; in some cases it is sufficient, that the intestines be nearly opened, and cleansed of fecal matters contained in it; this wound in many instances, gradually closes, and a complete cure ensues. The after treatment consists in covering the wound with a fine compress, with soft lint retained in place, by several compresses, a T bandage, and one passing over the groin; the patient must remain on his back, and follow a strict antiphlogistic regimen, during the progress of his cure, and should continue to wear a truss for a long time.

It is impossible to enter into a detail of the plans to be pursued, in cases where the adherence of the parts among themselves, or with the hernial sac, or their great bulk prevent their being replaced in the cavity of the abdomen. In the first of these cases, if the bond of union be only an albuminous lymph, it may readily be destroyed by the fingers, but if the adhesions are formed by cellular and vascular membranes, many prac-

titioners advise, that they should be permitted to remain, as their division by the knife is apt to produce inflammation, and their reproduction; in such a state of affairs, after the ring is divided, the tumour must be supported by a suspensory bandage; by such means it may gradually re-enter the abdomen, or at all events, diminish considerably in size; in the latter case, after the division of the stricture, an attempt must be made to reduce as much as possible of the tumour; the part that remains unreduced, is to be covered with compresses, steeped in some emollient liquid, and supported by an inguinal bandage; the patient must be kept on an antiphlogistic diet, and at the end of some days, another attempt must be made to effect the gradual, and if it be possible, the entire reduction of the tumour. If any foreign body is contained in that fold of the intestine, forming this hernia, so as to obstruct the passage of the fæces, or produce inflammation, a longitudinal incision is to be made in the gut, and the substance extracted, after which, the wound of the intestine must be kept in apposition with that of the external parts, until cicatrization takes place; this may be accomplished, by making a suture in the mesentery.

### *Reduction of Crural Hernia.*

In undertaking this operation, a perfect knowledge of the direction of the crural canal is requisite. It follows a line commencing at the centre of the orifice of the canal, about one inch from the spine of the pubis, passes an inch and a half or two inches within the anterior superior spinous process of the ilium of the opposite side; this line cuts nearly at a right angle that of the inguinal canal. This being remembered, the reduction of the tumour is to be performed by making all the pressure in the direction of the canal, the patient lying on his back, with the thighs slightly flexed on the pelvis; in other re-

spects the same rules are to be followed as in inguinal hernia.

### *Operation for Crural Hernia.*

After having divided the integuments and opened the herniary sac, in the same manner as has been directed when treating of inguinal hernia, the next object is to divide the stricture at the entrance of the canal.

With respect to the proper spot for doing this, there exists some diversity of opinion; most surgeons, however, agree, that it should be effected on the inner side, in the direction of the horizontal process of the pubis, on GIMBERNAT's ligament; but in cutting at this place, there is danger of wounding the obturator artery, which sometimes is given off by the epigastric, and passes behind GIMBERNAT's ligament; this occurs once in twenty times; it is also by no means unusual to find an anastomosing artery between the obturator and epigastric, also running beneath the same ligament.

If the cut be made directly upwards, there is risk of wounding the spermatic chord, although BOUCHET, of Lyons, has several times operated with success by this method.

DUPUYTREN's mode is, however, to be preferred; that is, to cut in the direction of a line, which, commencing from the centre of the crural canal, passes an inch and a half within the anterior superior spinous process of the ilium of the same side, always bearing in mind that the incision is to be made by pressing the bistoury on the part to be divided, rather than by cutting, for if the epigastric artery be met with, it would be in an oblique direction, and consequently would recede before a knife used in this manner. Mr. LISFRANC is of opinion, that a stricture may thus be divided over GIMBERNAT's ligament, cutting upwards and inwards. It is unnecessary to



repeat here the principles which are to guide an operator in the introduction and use of the knife; but we must insist on the superiority of the bistoury of ASTLEY COOPER, in all cases where there is any danger of the intestine being wounded; this has already been described in the article on the operation for inguinal hernia. In females the operation is the same as in males, although some surgeons recommend that the division of the stricture should be made directly upwards, alledging the round ligament may be wounded without danger; an opinion we cannot accede to, especially as this ligament is oftentimes accompanied by an artery of a size that would be dangerous to cut.

### *Reduction and Operation for other Abdominal Herniæ.*

The reduction of umbilical, ventral, and other abdominal herniæ, by the taxis, are to be conducted on the same principles we have laid down when speaking of inguinal hernia. The essential point is an accurate knowledge of the direction of the canal by which the tumour has escaped, and to direct the pressure accordingly, always taking care to reduce those parts first, which are nearest the opening through which they have passed. As to the operations for these herniæ, when strangulated, present fewer difficulties than in inguinal and crural herniæ, the principal point is to remember the situation of the arteries, and avoid them accordingly.

### *Prolapsus Ani.*

The most frequent cause of this disease (to which children and the aged are most subject,) is the relaxation of the mucous membrane of the rectum, as it is connected to the muscular coat by a very weak cellular tissue, is apt to be protruded from the anus, where it forms a tumour.

Mr. DUPUYTREN has treated this affection with great success, by cutting off some of the folds of the mucous membrane of the rectum from the prolapsed part, by means of scissors curved laterally. The reduction is then to be made, beginning with the part nearest the anus; whilst doing this, the patient must be laid on his back or face, with his thighs a little flexed on his pelvis; the gut being replaced, it is retained and supported by means of a pessary and bandage, which are to be taken off when the patient goes to stool, and immediately re-applied.

These excisions have not only the good effect of lessening the size of the protruded intestine by disgorgeing of blood, and thus facilitating the reduction, but also by the inflammation which supervenes in the wounds, a stronger adhesion takes place between the mucous and muscular coats, thus preventing a relapse, a result which it is often impossible to procure by the ordinary mode of treatment, which consists in simply reducing the tumour, and applying a pessary, compresses, and bandage to support it.

### *Prolapsus Vaginæ.*

'This disease has great analogy to the preceding, and is to be treated in the same manner.

### *Prolapsus Uteri.*

'The uterus may fall into the vagina, or even protrude from its orifice and form an oblong tumour of a nearly cylindrical shape, between the thighs. The indication to be fulfilled, is to replace this organ in its proper position, and retain it there.

To obtain the first result, the patient is to be laid on her back on the edge of a bed, as in the operation for stone, each foot supported by a chair, the thighs apart

and flexed on the pelvis. The surgeon having his fingers lubricated with oil or mucilage, is to press the tumour upwards, at first in the direction of the axis of the inferior strait, and afterwards in that of the superior. In ordinary cases the reduction is effected with great ease, the patients often accomplishing it themselves. The uterus is to be maintained in its place by a pessary; this instrument, made of gum elastic, is a kind of oval cushion, and is to be introduced as follows: after choosing one of a proper size, it is to be dipped in oil and passed into the vagina, in its smallest diameter; when it is introduced, it is fixed with the oval in a transverse direction, so that its two extremities correspond with the internal side of the tuberosities of the ischium. The pessary should be removed and cleansed every four or five days, and be renewed whenever its surface becomes rough and uneven.

### *Retroversio Uteri.*

This accident seldom happens, except after a delivery; if the retroversion be not complete, it is merely necessary to push the womb upwards, into its proper position. But when it is complete, the difficulty of remedying it becomes much greater. After placing the woman in the posture described in prolapsus uteri, pressure is to be made with the fingers, previously well oiled, on the sides of the uterus, pushing it upwards, and commencing with the part nearest the vulva, as in prolapsus.

To prevent a recurrence, the patient should be kept in bed, in a supine posture, with her thighs closed and her pelvis elevated, for several days; after which, a pessary is to be introduced.

*Procidencia Iridis.*

When there is a protrusion of the iris through an opening in the cornea, it is recommended that it should be replaced by pressing it back with a strong probe, and afterwards keeping the patient lying on his back in a perfectly horizontal position, at the same time exercising a light pressure on the eye, by means of a bandage, in order to prevent a recurrence of the protrusion. If the iris cannot be replaced, it must be cut off with small curved scissors, and the eye dressed with astringent washes, in order to hasten the cicatrization of the wound.

*Fall of the Upper Eyelid.*

When this disease arises from an incurable paralysis of the elevator muscle, the following operation must be resorted to.

The patient is to be seated in a chair, with his head supported against the breast of an assistant; the eyelid is seized about its middle, with a pair of forceps, both by the operator and an assistant, so as to form a longitudinal fold parallel to the tarsus. The surgeon, with a pair of slender curved scissors, is to remove this fold, cutting from without inwards. The lips of the wound unite and cicatrize, and of course the lid is shortened. The part removed ought to be of sufficient size, to prevent the lid from covering the pupil, when cicatrization takes place.

*Inversion of the Eyelids.*

In this disease, SOARPA and many other surgeons advise that a longitudinal portion of the lid be removed, as in the preceding case; this loss of substance causes the lid to resume its natural position when the lips of the wound unite. When this means is insufficient to

restore the lid to its proper place, and the ciliæ continually rubbing against the ball of the eye, cause great pain and irritation, they must, therefore, be removed as directed in the article on Removal of the Eyelashes.

### *Eversion of the Eyelids.*

To remedy this deformity, that portion of the conjunctiva which forms a prominence on the free edge of the lid, must be removed. The patient is to be seated opposite a well lighted window, with his head resting against the breast of an assistant; the surgeon placed in front, is to raise the enlarged conjunctiva with a pair of slender forceps, and if he is not able to command a sufficient quantity, he is to be assisted by an aid; he is then, with a pair of curved scissors, to remove the fold at one cut, as in the above mentioned cases. When the eversion is great, SCARPA advises that the conjunctiva should be dissected off from the tarsus to where it is reflected over the ball of the eye, and afterwards to remove a fold with the scissors. The hemorrhage is not great, and is arrested by lotions of cold water.

A perfect cure is effected in a few days; if inflammation should supervene, it must be reduced by the common antiphlogistic means.

### *Operations to facilitate Reunion in Wounds of the Soft Parts.*

Sutures are useful in inducing the union of wounds, in which the lips are thin and apt to be displaced, as often takes place in divisions of the cheeks, lips, eyelids, nostrils, &c.; in wounds of the intestines, and parietes of the abdomen, in some of those of the scalp, in lacerations of the perineum, &c.

There are several kinds made use of, but those most commonly employed are, the interrupted suture, the

looped suture, Glover's suture, the quilled suture, and the twisted suture.

### *Interrupted Suture.*

The wound being cleansed, and its edges brought together by an assistant, the surgeon taking a threaded curved needle in his right hand, and placing the thumb on its concave surface, about the middle of its length, while the fore finger is placed upon its convex surface, parallel thereto, he plunges through the substance about one, two, or three lines from the wound, and near one of its angles, in order that the edges of the wound shall correspond exactly throughout their whole length. When he judges that the point of the needle has arrived at the bottom of the wound, he elevates the point by depressing his hand; the opposite edge is traversed from within outwards, and the needle comes out opposite the point by which it entered, and at an equal distance from the edge of the wound. To render the passage of the needle less painful, we place the extremity of the thumb and fore finger of the left hand upon the points it is to penetrate. We then take one, two, three, or more stiches, according to the length of the incision, or the extent of the flaps we wish to unite. The stiches should be equidistant. When all the stiches are passed through, we cover the wound with a pledget of dry and fine lint, and bringing the ends of the threads together, we tie them separately, making first a simple and then a bow knot. The suture should be neither too tight nor too loose; should it be too tight, the swelling produced by the inflammation will render the parts painful and may make the stiches cut through the texture: when too loose, the union cannot take place.

The knots are placed at the least dependent part of the wound, in order that they may not be much soaked in the pus which flows. We remove the stiches at the



end of four or five days after the operation, if nothing interrupts the cure. The patient should be kept in a proper position, and the bandage be applied for some days, in most cases, after the stitches have been removed.

### *Looped Suture.*

To make this suture, we take as many straight or curved needles, according to the parts upon which we are to operate, as we intend to make stitches; each needle is threaded with an unwaxed thread. The needles are passed through the lips of the wound, in the manner which has been indicated, for the interrupted suture. When all the threads are placed at the distance of some lines from each other, we remove the needles, and we bring all the ends of the threads into one mass, and twist them together, so as to make but one cord. By this method, the divided parts are puckered, and the union of the edges of the wound is exactly maintained. This suture, which has been particularly used for wounds of the stomach and intestines, is attended by many inconveniences; hence, we are advised to relinquish it for the following suture, which is thus described in the new edition of the *Operative Surgery of Sabatier*, by Messrs. SANSON and BEGIN.

“The wounded part is held between the fingers of the surgeon and those of his assistant; the two lips of the wound are then pierced, at a line or line and a half from their edge, with a straight needle, carrying a single waxed thread. A second is introduced, at the same distance from the side at which the first comes out. Continue thus to introduce them, until all the points are ranged on the same line. By operating in this manner, the lips of the wound will be united, and present without interposition to those of the integuments, with which nothing impedes their union, and when they have united, the

threads may be withdrawn, without fear of pulling the parts asunder."

### *Glover's Suture.*

When the textures upon which we operate are very delicate, we make use of a straight and slender needle; in cases of the opposite kind, we employ a curved one. The edges of the wound are brought together, and retained by an assistant, while the surgeon holds them himself, near the extremity where he wishes to commence the suture; he pierces then obliquely, from right to left, at one or two lines distant from one of the angles of the wound, and at the same distance from each of its edges. He draws the thread until within a few inches of its extremity, and he again passes the needle in the same manner, and from the same side as at first, and at the same distance from the edge of the wound. He continues to use the needle in this way, introducing the needle always on the same side, until he reaches the other angle, where he finishes, by taking care to leave some inches of the thread unconfined, as he did in beginning. After four or five days, we remove the thread thus spirally arranged, cutting on one side, close to the flesh, and pulling gently at the other end, with the right hand, while the thumb and two fore fingers of the left are applied to the edges of the wound, to prevent tearing.

This suture employed in the same cases as the preceding, is very generally rejected, because it commonly happens that the presence of the threads, which pass over the edges of the wound, at every stitch, prevent their union, with the adjoining integuments, which is very desirable in wounds of the stomach and intestines.

*Quilled Suture.*

This suture is commonly used in wounds of the abdominal integuments and walls. An assistant brings the lips of the wound together; the surgeon uses a curved needle and thread, exactly as in the interrupted suture. The only difference is, that the threads are so doubled, as to leave a loop at one of their extremities. When all the doubled threads required by the extent of the wound, are passed on the same line, and the loops being all placed on the same side, we pass the barrel of a quill through these loops, and another quill barrel between the threads on the opposite side. We then tie the open ends of the threads over the last mentioned quill, by a bow-knot, having tightened them so as to bring the edges of the wound into contact; if it be proposed to unite them by the first intention. The knots should always be tied on the least dependent side of the wound, in order that they may be less soaked in pus. The threads are removed at the end of four or five days, by cutting them on the lower side of the wound, and cautiously withdrawing them on the other. This is one of the most excellent and least irritating sutures.

[FOR THE TWISTED SUTURES, SEE OPERATIONS FOR  
HARELIP.]

*Other modes of procuring Union.*

The application of sutures to parts thicker than those we have spoken of, to the muscles for instance, is not only useless but even dangerous, because it irritates without being able to produce adhesion. If the wound affects parts externally situated, the approximation of which may be easily maintained, without many efforts, sutures again become useless, and should not be resorted to, whenever it is possible to do without them. If then

the incision be large and deep, we employ the uniting bandage, if it be superficial we use simple adhesive straps.

It is impossible in this place, to enter into all the details, which a description of individual cases, requiring the employment of sutures and uniting bandages. We shall confine ourselves to the operation for harelip and the staphyloraphia. In relation to have indicated them, as the understanding of the surgeon must direct him to the most proper choice of means to be employed.

### *Operation for Harelip.*

This malformation is single or double. When it is double, it is better to operate on but one side at a time, and not attempt to unite both fissures at the same time. However, when the free portion is very narrow, we may remove it, and then unite them, as if it were a single harelip. When this centre portion is not very large, we may cut it into a triangular form, by taking off the loose point, and making the edges raw on each side. The edges of the fissure being then made raw, we apply them against those of the triangle, and keep them in contact, by the mode now to be described.

As the harelip is commonly congenital, it has been asked, at what period of life it is most advantageous to perform the operation. Some think it best to wait till the patient is five or six years old, before operating; others say the operation should be performed six or seven weeks after birth. But at present, this opinion is generally abandoned, as convulsions often come on, and endanger the lives of infants operated on, at that tender age. Hence, we generally wait until the child is one or two years old, before we perform this operation; but success is still more certain, if we wait until the patient is six or seven years old, because the lips of the wound bear the sutures better at that period, and are less exposed to ulceration, which would require a

repetition of a painful operation. In England this operation is commonly performed with the knife, and the wound is united by means of stitches; in Paris, most frequently the bistoury is used, and the lips of the wound are brought together, by means of harelip pins, having a thread passed round their ends, in the form of a figure of 8; each of these modes has its advantages; yet it must be agreed, that the operation done with scissors, ought to be less painful, more expeditious, and occasion less hemorrhage, a circumstance which deserves to be taken into consideration, especially if the subject is very young.

*Operation for harelip with the bistoury.*—The patient is seated upon a chair, or placed upon the lap of another person, if it be a child. The head is strongly held against the breast of an assistant, who placing his hands upon the patient's cheeks, pushes the upper lip forwards with the fore fingers, in order to bring together the edge of the fissure. Then the surgeon, with a straight bistoury, cuts all the unnatural adhesions which unite the lips to the gums; he places under the right side of the wound a small flat piece of wood or sheet lead, which he retains with the fore and middle fingers of the left hand, while the thumb presses on the lip. He carries the point of the bistoury, held in the first position, towards the septum of the nose, and cuts from above downwards the edge of that side of the lip. Placing then the little piece of wood or the sheet lead under the opposite side, similar to the first, he removes the edge of the lip, as in the first instance, so that these two incisions may correspond at all parts. The English unite the wound generally by the interrupted suture; this mode is now most commonly rejected.

*Operation for harelip with the scissors.*—The patient being placed as in the former case, the surgeon takes hold of the right side of the wound by its inferior part,

with the thumb and fore finger of the left hand, and placing the edge of this side of the wound between the blades of strong scissors, he removes it at one stroke from one side to the other. He performs the same operation on the opposite side, by taking care that the two incisions correspond exactly, and terminate at the same point of the angle of the wound.

The needles are next to be applied, to keep the cut edges in contact. We may, indeed, make use of common pins, as has been done for many years in the Hotel Dieu of Lyons; most commonly we employ steel pins, with lance-shaped moveable points; or when circumstances permit, we may employ pins of platina or gold. After having greased the point of the pin, the surgeon takes it by the middle, between the thumb and middle finger of the right hand, while the fore finger is supported on the head; the edges of the wound being exactly approximated, he thrusts the pin into the thickness of the lip on the left side, about an inch and a half from the edge of the wound, to make it come out at the same distance from the wound, through the opposite side of the lip, taking up near the two anterior thirds of its thickness. The first pin should always be inserted towards the inferior part of the lip; the first needle ought to be placed, so as to secure the edges of the incision being made to correspond at all points.

This first needle being placed, we pass a waxed thread once under each of its extremities; the ends of the thread are then given to an assistant, who draws lightly on them from above downwards, in order to approximate the edges of the incision throughout their whole length. A second needle is then passed near the middle of the incision, by commencing on the same side, and concluding in the same manner as in the preceding case: Finally, we pass a third towards the superior angle, and always with the same precautions.



When all the pins are placed, we then take the two ends of thread, confided thus far to the assistant; we cross them to bring them in front of the first pin, and then carry them again under its extremities. We pass them in like manner, under the other pins, forming so many figures of 8. After doing the same on the upper pin, we tie the two ends of the thread in a bow knot; then place a soft compress on each side of the wound under the pins, for fear that they may irritate the subjacent parts. The sorts of rings formed by the pins and loops of thread, should neither be too tight nor too loose.

In cases where the lips of the wound are too far separated to allow of their being brought together as sometimes happens, especially after an accidental harelip, we detach the lips and cheek internally from the maxillary bone, as we are occasionally obliged to do after the removal of a cancerous tumour of the lower lip.

If we wish to associate with the suture adhesive plasters, as a secondary mode of reunion, we do it in the manner directed by Professor Roux. We apply on each side of the cheek a square piece of strongly adhesive plaster on each cheek, the anterior edge of which is pierced with holes, through which two or three threads are passed; after having passed those of one side through those of the other, so as to make them cross the lip between the pins, we draw them in opposite directions, to bring forwards the cheeks, to which the two plasters are attached. We then fix the threads to the cap of the patient. This mode will suffice in a young patient, but for an adult we should have recourse to the uniting bandage, which we apply as follows:

The head of the patient being covered by a cap fixed by some circular turns of a bandage, we place across it on the top of the head, a narrow and long compress, whose ends are at first pendant to the base of the lower jaw; we place then on the ends of this band or com-

press, two thick graduated compresses, which an assistant holds for an instant with his two hands, at the same time that he pushes them forwards. The surgeon applies the middle of a double-headed roller on the forehead; the two ends are then carried over the lateral parts of the head to the occiput, where they cross each other. They are then brought to the front, over the graduated compresses to the upper lip, where they are again crossed and carried over the compresses, and around the head. After having been twice or thrice carried in this direction, we then fix the ends of the bandage to the cap; after this we raise the pendant ends of the band under the graduated compresses on the cheeks, and fix them in the same manner to the lip, with pins. We then apply to the chin the middle of a four-tailed bandage, which sustains the lower jaw, and contributes at the same time to support the graduated compresses. The ends of this bandage are also raised upwards, and fixed to the bandage on the head.

The patient must avoid speaking or laughing, and must eat such food as will not require the motions necessary in mastication.

The pins are not withdrawn until the end of three days, by commencing with the upper one; then taking out the lower, and lastly, the middle pin. It is unnecessary to disturb the thread before removing the pins. We ought even to allow these loops of thread now glued to the skin by the effused lymph to remain for some days, as they will perform the office of an adhesive plaster. When we withdraw the needle, we give it a slight rotatory movement without moving the lip, which is avoided by pushing a little upon the ends of the pins towards the side they are to be drawn from.

After the removal of the pins, the uniting bandage is reapplied during four or five days more, after which it is replaced by one or two adhesive straps, placed

across the cheeks and lips. If the infant cry during the removal of the pins, the assistant takes care to prevent the retraction of the edges of the wound, by keeping the cheeks pushed forward with the hands.

*Staphyloraphia, or Suture of the Soft Palate.*

As some individuals are born with the malformation, designated by the name of harelip, there are others who come into the world with the soft palate, and even the uvula bifid. The latter deformity sometimes accompanies the harelip, but it may also exist alone. In either case the following operation has been devised by one of the most distinguished surgeons in France, Professor Roux. The operation consists, as in the harelip, in rendering the edges of the separated parts raw, and bringing the edges of the wound together by means of sutures.

The patient is to be seated in a chair, facing a strong light, the head inclined backwards, against the breast of an assistant. The surgeon is placed in front of him, and causes him to open the mouth widely; to secure it in this position, he places a piece of cork in each of the angles of the jaw, between the teeth; these are steadied by an assistant, for fear of some unpleasant accident. Every thing being prepared, the surgeon then lays hold, first of the lower and loose edge of the left portion, with a pair of dressing forceps, introduced by the left hand into the fauces; then, holding a probe-pointed and narrow bladed bistoury in the second position, he carries it to the back part of the mouth, to cut the edge of the part of the palate, drawn tense by the forceps from below upwards. Taking hold of the other with the forceps in the right hand, he makes an incision on its edge, similar to the first, so that these two incisions shall unite by an angle near the palatine arch. Each of these two incisions should remove about a line

of the substance from the edges of the soft palate. We then introduce a curved needle, by aid of a proper handle, to the back part of the palate, carrying a waxed thread, and pass it through the soft palate from behind forward, at a line and a half from the loose edge, and at the same distance from the cut surfaces. A second needle, the eye of which receives the other end of the ligature, is introduced in a similar manner, and passed through the velum palati at a corresponding point on the opposite side. The ends of the ligature are then brought out of the mouth, and are given to an assistant, who avoids drawing with them in the slightest degree, because this would bring together the inferior extremities of the wound, which would impede the introduction of the other ligatures. The other ligatures are passed in the same manner as the first, taking care to pass them as nearly as possible, at an equal distance from each other. Two ligatures appear to be sufficient in ordinary cases, one inferiorly and the other in the middle part; but if the union cannot be perfectly produced in this manner, we pass a third ligature through the palate, near the superior angle of the incision. We then proceed to tie each of the ligatures, to produce the coaptation, by commencing at the lower one. The ends of the ligatures are cut off near the knot. The patient should, as much as possible, abstain from swallowing during the four days which the ligatures ought to remain. We support him during this time by the administration of clysters of nutritious fluids; or, better than this, we introduce fluid aliment into the stomach through a gum elastic tube.

This operation was perfectly successful in the first case in which Professor ROUX, its author, performed it.

The genius of the surgeon may suggest an analogous operation in case of division of the palatine vault, as

well as in many other congenital or accidental divisions.\*

## OF FRACTURES IN GENERAL.

All fractures may be divided into

1st. Transverse.

2d. Oblique.

3d. Comminuted.

4th. Simple fissures of bones.

The displacement of fractured parts may take place in many directions.

1st. According to the thickness of the bones.

2d. By the separation of the two fractured parts.

3d. By riding on each other.

4th. By elongation, as 1st, in some cases of paralysis; 2d, in some cases of oblique fracture of the neck of the femur.

5th. According to the direction of the limb; backwards, forwards, right, and left.

6th. According to the circumference of the limb.

Fractures may also be divided into

1st. Simple, without lesion of other parts.

2d. Compound; that is, accompanied by contusions, lacerations, rupture of the muscles, tendons, vessels, &c. &c.

3d. Incomplete; that is, of but one bone of the same limb.

4th. Complete, or of both bones of the limb at the same time.

\* *PHYRICK'S* forceps will be found a much better instrument for the introduction of the curved needles, in this operation, than the common handle, or *port-aiguille*.

But we generally say fracture of the fore-arm, or of the leg, when both bones are broken; and fracture of the tibia, fibula, radius, or ulna, when only a single bone is broken.

The existence of a fracture is generally known

1st. By the displacement of the parts, their elongation or shortening; this sign is obtained by the sight and touch, and by measuring the limb, either by a common measure, or by placing them together.

2d. By the movements we can occasion at the fractured parts.

3d. By the crepitation or grating we hear when the limb is moved; first, by the aid of the ear simply: second, aided by the shethoscope.

4th. By the difficulty or impossibility of moving the limb.

5th. By the pain.

The treatment of simple fractures should be,

1st. To reduce the displaced parts;

2d. To keep the fragments together;

3d. To remove the obstacles preventing the consolidation.

The reduction should not be attempted during the existence of much tumefaction.

To effect reduction, we generally have recourse to the following means.

1st. Extension.

2d. Counter extension.

3d. Coaptation.

Extension and counter extension are not performed for fractures of the patella, os calcis, olecranon, &c.

Extension and counter extension are made by the hands of a greater or less number of assistants, or if this be impossible, or inconvenient, we make use of bandages, towels, or sheets.

In fractures of the neck of the thigh, and of that of



the humerus, we fix to some permanent object, the band used for counter extension.

To effect the coaptation, the surgeon applies both hands on the fractured extremities, and brings them to their place, taking care not to press the soft parts against splinters of bone, which may project.

The patient should be placed on a narrow bed; we generally put the limb in a semi-flexed position, especially when the fracture is oblique. Absolute rest is indispensable, and should be continued until the perfect consolidation of the fractured bones. This is commonly from thirty-five to forty-five days in an adult, for the thoractic extremities, excepting the clavicle, and from forty to forty-five, for the inferior extremities. The fracture of the patella, requires about two months and upwards; that of the neck of the femur, from eighty to a hundred days. After this time, we should not allow the limb to be used at first, as if it had not been broken.

To keep the fragments in apposition, we employ bandages, which are varied to suit the condition of circumstances. We seldom employ a roller in fractures of long bones. The eighteen tail bandage is preferable.

When this is to be used, we require the following articles; 1st. two or three tapes; 2d. a splint cloth; 3d. splints of different length and breadth; 4th. a large number of strips of muslin, (sufficiently long to surround the limb, and three or four inches broad) disposed transversely, and partially covering each other; 6th. compresses to envelop the limb, which are commonly wet with some styptic liquor, such as a solution of sugar of lead, unless the limb be very much inflamed.

Besides these, we should always have prepared a number of small splints.

Every two or three days, the dressing is to be renewed,

without moving the limb,\* examining carefully, whether the fragments have remained in contact.

Should we find that there is displacement on one side, we place a graduated compress, and if this suffices to depress the projection, we suspend the compression. If we cannot succeed in giving the limb its proper direction, it may be even necessary to remove the splint on the opposite side. In this way, we often prevent shortening of the limb.

Should we apply leeches to allay irritation, it should never be over the points where the splints will press.

When fracture is complicated with luxation, we should, if possible, reduce the luxation first, and the fracture subsequently; otherwise we wait for the perfect consolidation of the fracture, and then reduce the luxation, taking care not to reproduce the fracture.

If the ends of the bone project through the skin, and are not too much injured, we enlarge the opening, and reduce them. Should there be exostosis and necrosis, &c. we saw the ends of the fragments off, and then reduce them.

In case of free suppuration, we make a large incision through the soft parts, to extract the splinters with forceps.

There is no inconvenience from waiting for five or six days, before attempting the reduction, for the adhesive process which unites the bones never commences before this time, except in infants. This reflection is very important, as it shows the surgeon that he has full time to combat the inflammation, before attempting the reduction.

\* This must be restricted to cases of transverse fracture, and to motion of the limb immediately, at the fractured part. In cases of oblique fracture, the limb is extended as much as possible, at each dressing, inasmuch, as the tendency to retract is almost continually operating.

There is another mode of retaining the reduced fragments, known by the name of *permanent extension*. This method intended solely for fractures of the neck of the thigh bone, and oblique fractures, should never be used, except in cases in which the other means are insufficient.

The following are the rules according to which this operation should be practised.

1st. To wait always until the inflammation about the fragments of the bone is reduced.

2d. To apply the extending and counter-extending power upon the superior and inferior parts of the fractured limb.

3d. To have the action of the power parallel to the axis of the fractured bone.

5th. To graduate the extension.

6th. To employ concurrently, the common bandage, excepting the splints.\*

\* A very great difference of opinion has long subsisted among surgeons, relative to the mode in which counter-extension should be made, and a very great variety of machines have been invented for the purpose of accomplishing it. At present, the most generally used apparatus, is some modification of DESAULT's splint, or of the inclined plane, which are found to be capable of effecting all that can be expected from machinery, without the risk and expense which many of the more recent splints, &c. produce. See GIBSON's Surgery, vol. 1.

J. D. G.

## FRACTURES OF BONES IN THE SUPERIOR PARTS OF THE BODY.

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### *Fractures of the nasal Bones, and the nasal processes of the superior Maxillary Bone.*

*Mode of reduction.*—Introduce a pair of dressing forceps into the nostrils, raise the fragments with them, and coaptate the fragments with the fingers of the other hand. To keep the bones in place, introduce a quill barrel, or an ivory tube, open at both extremities, having around it, a sufficient quantity of lint, to fill the cavity of the nostrils, and sustain the fragments.

### *Fracture of the Vomer.*

*Reduction.*—Introduce the jaws of a pair of dressing forceps, or a female catheter into one of the nostrils, and establish a point of compression on the opposite side, and thus bring the fragments into place. To retain them, plug the nostrils, so as to prevent the fragments from being displaced to either side.

### *Fractures of the lower Jaw.*

These are divided, 1st. into fractures of the body of the bone; 2d. into fractures of its rami; 3d. of the coronoid apophysis; and 4th. of its condyles.

When the body or rami of the bone are broken;

*Reduction.*—Take hold of the inferior edge of the jaw, and press it against the upper jaw. If we find this to be difficult, introduce the middle and fore finger of one hand into the mouth, between the dental arch and the cheeks, and thus aid the movements of the other hand. Apply the two dental arches against each other; should the jaw be toothless on one side, we introduce a piece

of metal or box wood, to fill up the place left vacant, by the loss of the teeth. If only one or two teeth be wanting, this circumstance will be advantageous, as it will allow the passage of the introduction of the nozzle of a syringe, or a tube, to convey fluid aliment into the stomach. To retain the parts in apposition, apply two compresses, one upon the anterior surface of the neck and the inferior edge of the lower jaw, which passing upon the cheeks and temples, is fixed upon the sinciput, where the two ends cross each other; the other upon the anterior surface of the chin, which passing over the ears, supported by lint, goes to be fixed over the occiput. These compresses being fixed, we apply the chin bandage.

This apparatus is preferable to the double head cover, which produces painful pressure on the head. If the lower jaw be divided into several fragments, shape, according to LISFRANCO's direction, a piece of cork, so as to resemble the semicircle of the lower jaw, piercing it with as many holes as there are teeth, to receive the latter. A loop of waxed thread embraces each of the pieces of cork, which separate the holes from each other. This apparatus being fixed upon the lower jaw, we pass the threads between the teeth, and tie them on the outside.

We then apply the head bandage, especially in fractures of the condyles and coronoid apophysis of the lower jaw. In the last case, we should also carry the lower jaw somewhat forward, in order to bring the middle fragment into contact with the lateral portions. Absolute silence, and entire immobility of the lower jaw should be enjoined.\*

\* Dr. JOHN R. BARTON has devised an ingenious bandage for fractures of the lower jaw. A delineation of this may be seen in GIBSON's Surgery, vol. 1.

*Fracture of the Os Hyoides.*

*Reduction.*—Place upon the sides of the neck graduated compresses, keep them in place by a bandage, so as not to interrupt the circulation of the blood. The head should be kept perfectly still.

*Fracture of the Sternum.*

There may be either fracture of the xiphoid cartilage, or of the sternum itself. Bandages are not applied for the first mentioned fracture. If this appendix be fractured above its base, apply compresses upon its point, to prevent it from projecting externally, sustained by a body bandage.

2d. For the fracture of the sternum itself: should the transverse diameter be greater than the antero-posterior diameter, apply a body bandage, which acting more especially in the direction of the latter diameter, carries the sternum forward. If the transverse be less than the antero-posterior diameter, augment the extent of the first by the aid of graduated compresses placed upon the sides of the chest. Then apply a body bandage. If this be insufficient, place graduated compresses over the superior and inferior fragments, on which the body bandage acts.

*Fracture of the Ribs.*

*Reduction, &c.*—Increase the antero-posterior diameter of the chest, by aid of graduated compresses placed upon the anterior and posterior part of the chest. Apply a body bandage, which presses particularly upon these compresses, from before backwards, and being strongly drawn, forces the ends of the fragments to project outwards, which will prevent them from compressing the



thoracic viscera injuriously. We may then place graduated compresses over the fracture, and above the first bandage, for fear that the fragments should project too much; we then apply a second bandage around the body, a little less tightly drawn than the first; these compresses placed over the first bandage will not force the fragments into the chest as if they were applied to the naked skin. This treatment is applicable to cases in which the displacement is inwards or outwards.

### *Fractures of the Spine.*

The merely mechanical means for the relief of such fractures, are very inefficacious; the prognosis is always serious, because it is impossible to replace the fragments without injuring the spinal marrow. However, the patient should be placed in a recumbent position, and with proper precaution, to avoid the accident referred to.

### *Fractures of the Scapula*

Are divided into

1st. Fractures of the acromion.

2d. Fracture of the coracoid apophysis.

3d. Fracture of the neck of the scapula.

4th. Fracture of its inferior angle.

5th. Fracture of the body of the bone.

1st. Fracture of the acromion. *Reduction.*—Raise the humerus, with the precaution of sustaining the external fragment of the acromion by means of circular turns of a bandage applied horizontally, and by ascending and descending turns. Fix the humerus thus raised, by a body bandage, which at the same time, goes round the scapula, and keeps it fixed.

2d. Fracture of the coracoid apophysis. Use nearly the same means.

3d. Fracture of the neck of the scapula. This is extremely rare. *Reduction, &c.*—Place a small wedge-shaped cushion in the axilla; keep the humerus against the body and a little forwards, by a bandage, which surrounding the whole body, also confines the scapula.

4th. Fracture of the inferior angle of the bone.—*Reduction.*—Bring the lower fragment in front of the superior, by carrying the arm inwards and forwards, to bring the body of the scapula to its inferior angle, from which it is sometimes detached, by moving it slightly forwards. To retain it, place in front of the inferior angle a graduated compress which is to be retained by a broad band, the first turn of which is applied over the inferior part of the humerus, and the circular turns pass round the body in such a manner, that in their ascent they shall cover about a third or the half of the breadth of each turn, in succession. If it be judged necessary, we may employ another bandage to sustain the limb, the first turn of which passes over the extremity of the elbow, and which ascends obliquely under the arm-pit of the opposite side. This bandage should not be tight, otherwise it is very inconvenient.

Fracture of the body of the bone. *Reduction.*—There is little displacement whether the fracture of the bone be oblique or transverse. To facilitate the consolidation, it is sufficient to keep the arm and scapula at rest. Apply the arm to the trunk by means of a simple sling, and its motion may be entirely prevented by passing a turn or two of a roller around the body, going over the arm.

### *Fracture of the Clavicle.*

*Reduction.*—Carry the shoulder outwards and a little backwards, by applying one hand on the inside of the arm, and seizing with the other its inferior extremity.

This fracture is difficult to be kept in place. A wedge-shaped cushion with its thick end upwards is placed in the arm-pit; at its two superior angles two tapes are fixed, which are tied upon the opposite shoulder. To prevent the cushion from causing too much irritation, Mr. DUPUYTREN covers it with compresses spread with cerate, and fixes the lower part of the cushion with turns of a bandage passed several times around the arm and chest, ascending from the elbow toward the shoulders.\*

### *Fractures of the Humerus.*

They are divided into fractures of the middle, and fractures of the neck of the bone.

1st. Fractures of the middle of the bone. *Reduction*—When there is displacement, make extension and counter extension; to do this, one or more assistants draw on the lower part of the fore-arm, first in the direction of the displaced fragments, while another grasps the stump of the shoulder with both hands, and keeps it fixed. The surgeon, placed on the outside of the limb, applies both his hands over the seat of the fracture, and when he feels that the riding of the fragments no longer exists, he directs the assistants to bring the limb straight, presses on the muscles, and brings the fragments together as much as possible.

To keep the fracture in apposition, the roller is a bad bandage for two reasons; first, because it imperfectly reduces the parts, and secondly, because it is more dif-

\* From our author's silence relative to DESAULT's bandage for fractured clavicle, we might suppose that this bandage was no longer employed as formerly in France. For a description of this bandage, the reader is referred to DESAULT's surgery, &c.—J. D. G.

difficult to remove the dressing without disturbing the limb. First apply a circular bandage from the head to the elbow joint; arrived there, half flex, and place a pledget of lint in the fold of the fore-arm; continue the circular bandage upon the arm. Having reached the fracture, make three circular turns, and continue them to the upper part of the arm. This is resorted to to prevent infiltration. Should inflammation exist, it cannot be employed. Apply then the eighteen-tail bandage; dress the limb every four or five days, and if there be no danger of displacing the fragments, dress it daily, in order to examine the progress of the union. The limb should be kept perfectly still.

If the fracture be compound, the eighteen-tail bandage is not employed. We are advised generally to apply a roller bandage with few splints; on the contrary, we should apply a great number, that is to say, instead of four we employ eight, but shorter, four above and four below the fracture; these splints are fixed by means of circular turns of a bandage; then we place four other splints of twice the length, outside the first. In this way the wound is free, and not in contact with the splints, which are thus raised by means of those placed below. We then fix the whole by means of new circular turns of the same bandage first used. The limb must be kept entirely still.

### *Fracture of the (surgical) neck of the Humerus.*

*Reduction.*—LEDUAN directs that a conical cushion should be placed in the axilla, to compress the head of the humerus, and thus prevent its displacement: apply the arm to the trunk, and retain it there by a bandage, continued from above downwards, around the breast and arm.

*Fractures of the Bones of the Fore-arm.*

These are divided into,

1st. fractures of both bones at the same time.

2d. fracture of the radius.

3d. ——— of the ulna.

4th. ——— of the olecranon.

1st. Fracture of both bones at once. *Reduction.*—

Perform extension and counter-extension: an assistant takes the arm with both hands, to make counter-extension; one or two other assistants take hold of the hand, and make extension. The surgeon, placed on the outside of the limb, applies both hands over the fractured part, and coaptates it. To retain the fragments in apposition, place graduated compresses on the anterior and posterior face of the fore-arm, in the direction of the interstice of the two bones, to maintain them in their natural position, and prevent their approximation. Place upon each of the compresses a splint, whose breadth exceeds the transverse diameter of the limb; fix these splints by means of turns of a bandage, which we begin, by applying it around the fingers and wrist, continuing the turns upwards to the arm. In passing over the fractured part, we make three turns; having arrived at the upper part, we descend, and after making three other turns over the fracture, we secure the bandage with a pin. The dressing should be repeated every two or three days; to see whether the fingers be in danger of gangrene, and examine whether the fragments remain in apposition. When there is a wound at the same place as the fracture, as in cases of gun shot wound, it is said, that splints are not to be used. Mr. LISFRANC advises, on the contrary, to place four compresses and four splints, two above and two below the wound, so as to leave it exposed. By this method, the two bones are preserved in a state of sufficient separation, and the wound is dressed with the greatest facility.

2d. Fracture of the Radius. The displacement cannot be considerable, the ulna being uninjured, and keeping the limb in a proper direction. It is to be reduced as in the foregoing fracture. To retain it, we apply a bandage similar to that used for the fracture of both bones, when the fracture is situated towards the middle of the limb, but if it be near the lower extremity, place, according to the direction of Mr. DUPUYTREN, at the union of the lower third, with the two upper thirds, a little cushion of a lengthened square shape. Place on the inside of the ulna, and above the other apparatus an iron splint, longer than the fore-arm, curved at one of its extremities, having five or six buttons or knobs. Make then over the fingers, two circular turns with a bandage, whose ends are to be fixed to the buttons on the splint. Should this apparatus make the fragments project too much outwards, we reject it, and apply some circular turns around the fragments, if they tend to separate from the ulna.

3d. Fracture of the Ulna. *Reduction*.—The same as in fractures of both bones, and for that of the radius. The same mode of dressing as for fractured radius. If the splint of DUPUYTREN be used, it should be placed on the inner side of the radius.

4th. Fracture of the Olecranon. *Reduction*.—Extend the limb, and bring the upper fragment against the lower, with the thumb and fore finger of the right or left hand, according to the side injured, taking care not to wrinkle the skin too much, which covers the olecranon. To maintain the apposition, apply the uniting bandage for wounds. To do this, one tail of the bandage is placed on the arm, so that of the three tails which are left, one of them shall be directed downwards; a graduated compress is placed transversely above the superior fragment; we bring the tails over this compress, to pass through the intervals of the inferior tails: then



draw on them, to bring the fragments into perfect contact; they are then fixed by means of a bandage, of which we make many circular turns around the limb, from the extremity of the hand up to the superior part of the arm, this method serves at the same time, to fix the first bandages, and to prevent infiltration. We then place a little cushion of lint in the fold of the arm, and apply a splint on the anterior surface of the limb, which is fixed by some turns of a bandage. This splint cannot remain long applied, without exposing the patient to danger of ankylosis, especially if inflammation exist.\*

### *Fracture of the Carpal Bones.*

The principal means we can employ in fractures of this kind, is the employment of the antiphlogistic treatment, to combat inflammation. If any bone project, and there be no external wound, which can scarcely happen, we may apply graduated compresses and splints over them, to reduce the fragments. Amputation of the part, commonly becomes our only remedy for this fracture, which must be generally comminuted.

### *Fractures of the Metacarpal Bones.*

*Reduction.*—Variable, according to the nature of the displacement; should this be from before backward

\* Two cases of fracture of the olecranon have fallen under my notice, in which the power of flexing the arm was lost, in consequence of a change taking place in the skin and cellular substance, over the fold and back of the arm, giving it something of the appearance, and almost the stiffness of a piece of hide, which has been deprived of its hair, and in a great degree dried. The practitioner, under whose charge the cases occurred, long and fruitlessly endeavoured to remove this condition, which was most probably owing to the peculiar splints, &c. used for the fracture.—J. D. G.

make extension and counter extension, coaptate the fragments, and place a large splint on the dorsal and palmar surface of the hand, keeping them on by aid of a circular bandage. If the displacement be lateral, place two narrow graduated compresses in the interosseous spaces, one on the palmar, the other on the dorsal surface of the hand, so that they shall rise to such a level, that the antero-posterior exceeds the transverse diameter of the hand. Place the splints over the compresses, and fix them by means of a band. If the first or the last metacarpals be fractured, and the fragments displaced outwards; that is, towards the radial or ulnar edge, we apply a splint on these edges, which we fix by a bandage.

### *Fractures of the Phalanges.*

If the fracture be comminuted, as is most common, we should amputate the part. If it be a simple fracture, an assistant sustains the hand, the surgeon extends the finger, and places the fragments in contact. To keep them together, make some circular turns with a little bandage around the fractured finger. Place three or four splints on this first bandage, and confine them by means of circular turns of the first used bandage. Extend the other fingers, whether fractured or not, make several circular turns around them, to confine them to the fractured one; this should at least be done with those immediately nearest to the broken finger. Where there is bruising or crushing of the soft parts, Mr. DUPUYTREN employs successfully, very small bandages, to produce the compression.

## FRACTURES OF THE LOWER EXTREMITIES.

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### *Fractures of the Pelvic Bones.*

These are divided into

1st. Fracture of the coccyx.

2d. ——— of the sacrum.

3rd. ——— of the ossa ilia.

1st. Fracture of the coccyx. *Reduction.*—Place in the rectum a graduated compress, or rather a compress in form of a little sac, which we stuff with lint in order to support the fragment. Keep the patient on a slight diet, in order that the frequency of evacuation shall not require the removal of the compress. Absolute rest must be enjoined.

2d. Fractures of the Sacrum. *Reduction.*—After using general and local blood-letting to calm the irritation, introduce the fore finger into the rectum, and if possible, replace the fragments. If we cannot reach them, and the bladder or rectum be not dangerously irritated, leave the parts as they may be, and wait for the consolidation to take place. But, should there be danger, expose one of the sides of the posterior face of the sacrum, below the sacro-iliac symphysis; apply the trephine, and then the ball-screw, in order to raise the lower fragment to its natural position; the upper one cannot suffer displacement.

3rd. Fractures of the ossa ilia.—We divide these into fracture of the anterior superior spine; of the iliac fossa; the horizontal portion of the pubis, and that of the tuber ischii. *Reduction, &c.*—If the anterior superior spine be displaced, which is rare, some graduated compresses secured by a body bandage, will be sufficient to prevent the displacement. In the fracture of

the iliac fossa, the displacement cannot take place; we do nothing but apply a body bandage.

If the horizontal portion of the pubis be injured, introduce the fore-finger into the anus or vagina, (with the precaution of making no pressure against the splinters, should there be any, for fear of producing lacerations) and replace the fragments. But this not succeeding, should the bladder and surrounding parts be not too much irritated, we allow the fragments to become consolidated without reduction. In the contrary case, expose the bone, apply the trephine and screw to bring the parts to their natural situations; apply a bandage round the body, and enjoin absolute rest.

In fractures of the tubera ischii, we employ the uniting bandage.

Fractures of the small bones of the feet are ordinarily comminuted, and often require amputation of the limb; otherwise they are to be treated nearly as the fractures of the hand.

### *Fractures of the Thigh Bone.*

*Reduction.*—Two assistants take hold of the foot with both hands, or by means of a towel, and make extension; two other assistants make counter extension from the pelvis. The surgeon, standing on the outside of the limb, sustains it, and coaptates the fragments.

To keep the fracture in this condition, apply an eighteen-tail bandage; place the limb in a half-flexed position, to relax the muscles; apply compresses over the fragments on the side where they are disposed to become displaced, and secure them by some turns of a bandage. Should one of the fragments project into the ham, place a thick graduated compress, and apply over this, which extends from the lower part of the joint ex-

tends five or six inches above the fracture. When the great trochanter is fractured, we place the thigh in a state of abduction; to bring the inferior fragment in contact with the superior, apply the uniting bandage as directed for fractures of the olecranon. The patient must be kept perfectly still.

### *Fractures of the neck of Thigh bone.*

*Reduction.*—The patient lying in bed, the surgeon passes his right or left arm, according to the side injured, under the ham, raises the thigh to a state of semi-flexion, and extends it to bring the fragments into contact. But the coaptation is speedily displaced, unless we make permanent extension; for this we do not employ the more or less murderous machines used for this purpose. Mr. DUPUYTREN contents himself with placing the limb in a semi-flexed position.\* For this purpose, we place cushions under the ham, raise the thigh, and lower the leg. We fix the limb in this position, by applying on the leg a cloth folded like a cravat, the two ends of which should be fixed to the sides of the bed. From time to time, the limb is gently extended, to bring the fragments into contact, because they are again easily displaced. The patient is kept in this po-

\* This treatment differs very little from that recommended by the celebrated POTT, which has been very generally relinquished. Although the machines in use are commonly imperfect, the chance of having the fracture consolidated without deformity is much greater, from the judicious application of a splint, than when the limb is exposed to the danger of being displaced by the slightest movement of the patient. With the most improved modification of DESAULT's splint, and the use of COATES's fracture bedstead, as employed in the Pennsylvania Hospital, few cases of marked deformity will occur even after the most oblique fractures.—J. D. G.

sition from sixty to an hundred days, according to his age, and he should not walk on it for many days after he has risen from bed.

### *Fracture of the Patella.*

*Reduction, &c.*—Apply the uniting bandage, as indicated when speaking of fractures of the olecranon. Extend the limb perfectly, to bring the fragments into contact. To do this, lay the leg and thigh on a plane, inclined from the feet towards the trunk, so that the limb thus raised forms, with the axis of the body, an angle of about  $45^{\circ}$ . The patient remains in this position from sixty to eighty days.

This apparatus is intended for the transverse fracture; should it be longitudinal, which is exceedingly rare, the treatment would be very much more simple. It would be sufficient to keep the limb in a state of extension, and at rest, upon its posterior surface, and to place a graduated compress on each side of the fragments, which are secured by means of a bandage.

### *Fractures of the Leg.*

These are divided into

1st. Fractures of both bones at once.

2d. Fracture of the tibia.

3rd. Fracture of the fibula.

1st. Fracture of both bones at once. *Reduction.*—One or two assistants take hold of the foot with both hands, and extend it; another assistant fixes the pelvis, and makes counter extension; the surgeon, standing on the outside of the limb, coaptates the fragments, by applying one hand on each end of the fragments. An apparatus is applied, similar to that pointed out for fractures



of the thigh, except that the splint which comes up above the knee should descend below the sole of the foot. A little bandage, whose first turn passes under the sole of the foot, is brought up, crossed over the ankle, and fixed by each of its ends to the sides of the splints. By this the foot is kept motionless. Place the limb in a state of semi-flexion, as DUPUYTREN directs, which is much preferable to permanent extension, as most authors advise.

To give the limb the semi-flexed position, the leg is laid upon its posterior surface, beneath which some pillows are placed.

Two cloths folded like a cravat, are passed, one around the upper, and the other around the lower part of the limb, and are fixed to the sides of the bed.

When the fracture is oblique, the displacement of the fragments will much more readily happen: in this case, we make use of small splints and graduated compresses to keep the fragments in place, as was indicated when speaking of *fractures in general*.

2d. Fractures of the tibia. *Reduction*.—In general, the same as in fractures of both bones at once. If we fear the displacement towards the interosseous space, we place over it some graduated compresses, as has been mentioned in fractures of the fore-arm. Other displacements, which occur in spite of the ordinary dressing, should be remedied by the application of small splints and graduated compresses. If there be a fracture of the ankle, apply a graduated compress upon the inferior fragment, then a figure of 8 bandage; place over this dressing a hollowed splint, which embraces the inferior extremity of the leg and superior surface of the foot; fix this hollow splint by means of some circular turns of bandage, or by straps and buckles. Examine the limb, from time to time, to ascertain whether the fragments are in contact.

3rd. Fractures of the fibula. *Reduction*.—Extension

and counter-extension is not necessary. Depress the external angle, if there be any separation, and bring it to the natural distance from the internal one, by giving the inferior fragment a motion opposite to that by which it passed outwards. Continue to keep the parts reduced, by using the common eighteen-tail bandage, with this difference, that we dispose the splints in such a manner that one extends beyond the external edge of the foot, and pushes this part strongly inwards, by means of more than the ordinary quantity of padding, while the other does not go beyond the internal angle.

The patient keeps this dressing on from thirty-five to forty days; at the end of this time a roller bandage is substituted for it during some days.

### *Fracture of the Os Calcis.*

*Reduction, &c.*—Apply the uniting bandage as heretofore directed, extend the foot by means of a slightly curved splint, fixed upon the anterior part of the leg and foot, the leg being in a state of semi-flexion. The muscles of the calf of the leg are compressed by the turns of a bandage, which secure the superior extremity of an uniting bandage. By this mode the two fragments remain in contact, and the consolidation may be expected about the fortieth or fiftieth day.

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## LUXATIONS.

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Luxation is the displacement of contiguous osseous surfaces.

The indications to be fulfilled in cases of this kind, are to reduce the luxation, preserve the parts in place,

guard against accidents, and combat them when they have supervened.

We shall successively describe, in a very succinct manner, the manual treatment necessary in cases of luxation.

#### LUXATIONS OF THE SUPERIOR JOINTS.

##### *Luxation of the lower Jaw.*

*Reduction.*—Seat the patient on a chair, and lean his head against the breast of an assistant. The surgeon wraps his thumbs with some linen, and places them as far back as possible, upon the last molar teeth, and at the same time, he grasps the jaw with the fingers flexed under the chin. He brings the bone downwards, by pressing with the thumbs on the molar teeth, carries it backwards, to disengage the condyles, and raises the chin with his other fingers. At the moment this is accomplished, he slips his thumbs between the teeth and cheek, in order to avoid being bitten, in consequence of the sudden and violent action of the muscles, bringing the condyles into the glenoid cavity.

The jaw should be confined for a few days, by means of a bandage, and the patient should for some time, abstain from the use of food, which requires mastication.

##### *Luxation of the oblique processes of the Vertebrae.*

Such luxations should not be reduced; the patient had better be allowed to remain slightly deformed, rather than endanger his life, by attempting the reduction.

### *Luxation of the Ribs.*

Luxations of either extremities of the ribs are so rare, that they have been doubted by numerous authors. Sometimes a displacement of the cartilages of certain ribs, in this case, the reduction is extremely easy. The cartilage is slightly compressed, which makes it project exteriorly. If some difficulty be experienced, we draw the trunk somewhat backward. A bandage is then applied round the body, and the patient kept at rest.

### *Luxations of the Clavicle.*

These are divided into luxation of the sternal and luxation of the humeral extremity of the clavicle.

1st. Luxation of the sternal extremity. *Reduction.*—The patient is seated, and his body kept steady by an assistant; the surgeon stands on the side of the luxation, and places one hand on the internal superior part of the arm, and the other on the external inferior part; pushing then this latter part towards the trunk, while he moves the upper part outwards, he changes the humerus into a lever of the first kind, which brings the clavicle to its natural situation, by a mechanism similar to that by which we reduce a fracture of this bone. To retain the bone in place, we use the bandage employed for fractures of the clavicle.

2d. Luxation of the humeral extremity. *Reduction.*—Carry the shoulder outwards, and raise it upwards, by suitable movement of the arm, press over the humeral extremity of the clavicle, to adapt it to the internal and superior part of the acromion.

This dislocation is as easily reproduced as replaced. To retain the bone in its situation, apply the bandage for fractured clavicle, modified so, that after having

placed long and thick compresses over the humeral extremity of the clavicle, we carry the turns of the bandage, which pass under the elbow, over the shoulder of the luxated side, and then over the opposite one.

### *Luxation of the Humerus.*

*Reduction.*—Place in the hollow of the axilla, a cushion stuffed with hair or wool, of a rounded form, and sufficiently large, that the band employed for counter extension, shall not compress the tendons of the pectoralis major, latissimus dorsi, &c. too much. The band is made with a double napkin, passing one end behind the shoulder, and the other in front of the clavicle; this is to be secured to some fixed point. A towel folded diagonally, is passed round the wrist, and a number of assistants are directed to pull by it, proportioned to the strength of the individual. The patient being seated, the surgeon, placed on the outside of the arm, orders the extension, which should be first made in the direction which the bone has taken; and when the surgeon feels the bone yield to the efforts, he guides the bone into its place, at the same moment that he makes a signal to the assistants, to bring the limb to its natural position. To keep it in place, fix the humerus against the trunk, by means of some turns of bandage near the ulnar extremity of the arm, around the body, and if deemed necessary, we may place a cushion in the axilla.

### *Luxations of the Fore-arm.*

These may be divided into, 1st. luxations common to both radius and ulna: these are luxations of the fore-arm, properly so called. 2d. Luxations of the superior extremities of the radius. 3d. Luxations of the inferior extremity of the ulna.

1st. Luxation common to the radius and ulna. *Reduction.*—In the luxation backwards, in which the olecranon ascends behind the humerus, an assistant lays hold of the arm, and makes counter extension; another takes hold of the wrist, and makes extension, the surgeon grasps the elbow with both hands, so that the fore fingers of each, press upon the inferior extremity of the humerus, while he brings down the olecranon with the thumbs. To maintain the reduction, place the arm simply in a sling, first surrounding it as well as the hand, with a roller, in order to prevent œdematous swelling of these parts. At the end of seven or eight days, when the swelling has ceased, make slight movements of the joint, in order to prevent ankylosis.

As the luxation forwards necessarily supposes a fracture of the olecranon, it does not require a treatment different from what was directed for fracture of the olecranon.

2d. Luxation of the superior extremity of the radius. *Reduction.*—When the displacement is backwards, as is most common, the surgeon takes hold of the elbow with one hand, and with the other the hand of the patient, which brings it towards a state of supination, at the same time that he presses from behind forward, on the luxated extremity. If the displacement is forward, we move the hand in the opposite direction, while with the thumb, we press from before backward, on the superior extremity of the radius. Place the arm in a sling, after having surrounded it with a roller bandage, in order to prevent œdema, and keep the two bones in contact.

3d. Luxation of the inferior extremity of the ulna. *Reduction.*—The patient being seated, and the arm sustained by two assistants, the surgeon, placed on the outside of the limb, grasps the lower part with both hands, one of which is placed on the ulnar, and the other on the radial surface, so that the two thumbs may be



supported in the interval of the two bones, on the side of the displacement, and that the four other fingers may be placed over the opposite point. He then makes efforts, as for the separation of the two bones from each other, and directs the assistant, who holds the hand, to move it in the direction of supination, if the luxation be backward, and in that of pronation, if the luxation be forwards. To retain the parts in place, use the same means as in luxations of the radius from the ulna.

### *Luxation of the Wrist.*

*Reduction.*—An assistant grasps the upper part of the fore-arm with both hands, and makes counter-extension; another assistant grasps the metacarpus, and extends the wrist. As soon as the surgeon perceives that the wrist yields to the extension, he pushes with both hands the convexity of the displaced carpus towards its place, and directs the assistant, who holds the hand, to move it in a direction opposite to that which occurred at the time of luxation. To retain it in place, if the luxation be lateral, it is sufficient to surround the joint with long compresses, dipped in some refrigerant solution, and retain them by aid of a roller. But when we have a case of luxation backwards or forwards, it is necessary to place two long compresses and two wooden splints, one anteriorly, and the other posteriorly, retaining them with a roller.

### *Luxation of the Os Magnum.*

The os magnum is more subject to luxation than all the other bones of the carpus. The head of this bone may escape from the cavity, formed for it by the scaphoides

and lunare which receive it. *Reduction*.—Make a slight pressure upon the head of the os magnum, which projects on the back of the hand. To retain it in place, keep the hand in permanent extension, by means of a wooden splint, placed in the palm, compress the projecting bone, by applying a graduated compress, on which we apply a small splint, held in place, by a roller bandage, surrounding the whole dressing.

### *Luxation of the Metacarpal Bones.*

With the exception of the first metacarpal bone, which is solely articulated with the trapezium, the other metacarpal bones, are so little exposed to external bodies, as scarcely to be susceptible of luxation. *Reduction*.—An assistant draws by the thumb, while the other fixes the hand, by acting upon the inferior part of the fore-arm. The surgeon acts with his thumbs upon the superior extremity of the luxated bone, and makes it re-enter the socket, whence it has escaped. To retain it in its place, surround the wrist with compresses, soaked in a refrigerating fluid, secured by a roller bandage. Place along the posterior part of the bone a compress, and over that a wooden splint, which is fixed by the remainder of the bandage. If inflammation be present, we first reduce it by the antiphlogistic treatment, and then apply the bandage, &c.

### *Luxation of the Phalanges.*

The first phalanges of the fingers being all articulated with the metacarpal bones by means of arthrodia, or ball and socket, and the other phalanges with each other by means of ginglymus or hinge, it will be sufficient to describe the treatment for one of these luxations, to

explain how the others should be treated. Let us take, as an example, the luxation of the first phalanx of the thumb. *Reduction*.—An assistant takes holds with both hands of the lower part of the fore-arm to make counter-extension, while another assistant draws upon the thumb to extend it, the surgeon presses with his two thumbs upon the base of the phalanx, and pushes it forwards and downwards, while the assistant, who draws upon the thumb, brings it towards the flexed position. When the reduction is difficult,\* we place a pulley upon it to produce the extension. When it is reduced, the same mode of retaining it in place may be resorted to as those indicated in the preceding article.



## LUXATIONS OF THE INFERIOR EXTREMITIES.



### *Luxations of the Femur.*

This luxation may occur in four different directions: 1st. upwards and outwards; 2d. upwards and forwards; 3rd. downwards and inwards; 4th. downwards and backwards. *Reduction*.—This is nearly the same in all four species. Place in the fold of the thigh on the sound side a

\* The luxation of the first phalanx of the thumb from the metacarpal bone is always difficult of reduction, in consequence of the situation of its lateral ligaments, and the large segment of a circle it must describe on account of the projection of the extremity nearest the palm, before it can be restored to its place. It may occasionally be found necessary to divide a part or the whole of the lateral ligament, in order to reduce the dislocation. In CHARLES BELL's *Operative Surgery*, a very good diagram is given to show the nature of the obstacles here alluded to.—J. D. G.

counter extending band made with a doubled sheet, and still better, place this band over a cushion stuffed with chaff, wool, or hair, nearly as we have stated in luxations of the humerus. Let several assistants lay hold of this band, or fix it to some permanent object. Apply transversely, a second band made in the same manner over the crest of the ilium on the side of the luxation; bring the ends of this band over the sound side, and let them be held by assistants in order to prevent the pelvis moving towards the injured side. A greater or less number of assistants make extension, by drawing first in the actual direction of the limb, by means of a napkin folded lengthwise, and applied around the lower part of the leg. The surgeon, placed on the outside of the limb, presses upon the great trochanter, or the projection formed by the head of the luxated bone, to direct it, at the same time that he directs the assistants, who are making the extension, to bring the limb into its natural direction. To maintain the limb in place, bring the two thighs together, and keep them in this condition by means of circular turns of bandage placed just above the knees. Keep the patient quiet for some days, until the ligaments have become united after having been ruptured, which almost always happens, except in luxations downwards and inwards.\*

\* The reader, who wishes to study the subject of fractures and luxations to advantage, will find in Sir ASTLEY COOPER'S work on the subject most ample descriptions of the varieties of these accidents, and the necessary treatment. Among other things, this very experienced surgeon proves clearly the vast superiority and manageableness of pulleys as means of extension over the manual exertions of assistants, who from want of concert or of patience, not unfrequently cause unnecessary delay and suffering.—J. D. G.

### *Luxation of the Patella.*

Authors admit of luxations of the patella in four different directions: upwards, downwards, outwards, and inwards; but the two first not constituting a luxation properly so called, we only treat of the luxations outwards and inwards.

*Reduction.*—Extend the leg strongly on the thigh; which should itself be flexed on the pelvis to bring the tendon containing the patella into a state of relaxation, then push the bone inwards or outwards, according to the direction of the luxation. To keep it in place, the limb should remain extended; surround the knee with compresses squeezed out of some cooling fluid, applying a roller to retain them.

The patient should for some time remain in bed.

### *Luxation of the upper extremity of the Tibia.*

*Reduction.*—In whatever direction the head of the tibia has abandoned its relations with the femur, we reduce it in the following manner: an assistant takes hold of the lower part of the thigh with both hands, and makes counter-extension; one or more assistants take hold of the lower part of the leg in the same manner, and make extension, according to the direction the displacement has given to the limb. The surgeon, placed on the outside of the limb, grasps the condyles of the femur with one hand, and the upper extremity of the tibia with the other, to make the reduction, until he judges that the extension is sufficient, and directs at the same time the assistants who perform it to bring the leg to its natural position. After reduction, surround the knee with compresses soaked in a refrigerant fluid; secure them by the aid of a roller, and keep the limb extended. Should a re-

currence of the luxation be feared, we apply the apparatus indicated for fracture of the thigh. It is not uncommon that injuries of this joint make it necessary to amputate the thigh.

### *Luxation of the Fibula.*

Luxations of either the upper or lower extremities of this bone are extremely rare, as they are more easily fractured than luxated. To reduce them, it will suffice to push the superior extremity of the tibia in a direction contrary to the displacement, and bring the foot at the same time to its natural position. To retain it thus, we place graduated compresses on the luxated side, which are retained by a roller bandage.

### *Luxation of the Foot,*

The luxation of the astragalus happens most frequently of all the displacements of the bones of the foot. It may take place inwards and outwards, backwards and forwards. The first is the most frequent of all. The treatment is very nearly the same in all the species. *Reduction.*—The patient lies on his belly; an assistant takes hold of the lower part of the leg with both hands, to make counter-extension. The surgeon, standing on the inside of the limb, grasps the lower part of the leg near the ancles with one hand, while with the other he guides the displaced bone into its cavity as soon as he perceives that the ligaments and tendons yield to the extending efforts, which ought first to be made in the direction given to the limb by the dislocation, and afterwards in the natural direction.

After effecting the reduction, surround the joints with long compresses soaked in some cooling fluid, and re-



tain them by means of a roller bandage, applied in a figure of 8. We then apply cushions of straw, and splints along side of the limb, and fix them nearly as is done in fractures of the leg, in order to keep the foot in its natural position. Absolute rest should be continued during several weeks.

When the astragalus is luxated from the os calcis and scaphoides at the same time as from the bones of the leg, and is thrown out so as to hang to the neighbouring parts only by a few ligamentous fibres, we should cut them and extract the bone entirely, which we do by the point of the bistoury or with the scissors. We then dress the wound, and the bones gradually approaching the os calcis, become united to that bone, and the patient may recover although without being able to move the foot on the ankle.

When the astragalus projects through the lacerated integuments, or is so constricted by them, as to prevent its reduction, we should enlarge the opening by an incision, to remove the stricture, after which, the bone may be returned with sufficient facility.

When other bones of the feet are dislocated, which is infinitely rare, we should treat the accident nearly as we have directed, in case of luxations of the carpus, metacarpus, and phalanges.



## RICHERAND'S OPERATION ON THE RIBS, &c.

Surgery is indebted to Professor RICHERAND for the first essay, made to perform this daring and brilliant operation: it was successful in the hands of this skilful surgeon, and though the patient did not survive a long

time, this accident should by no means, be regarded as resulting from the operation, but from the reproduction of the cancerous affection under which the patient had suffered. We quote the author's description of this operation; and leave it to the genius of the surgeon to seize the particular indications in analogous cases.

"Every thing being prepared—I laid bare the sixth rib, for about four inches of its length, with a probe pointed bistoury, the point of which I carried along the superior and inferior edges of the sixth rib, cutting the intercostal muscles; then I sawed through the bone, at the two extremities of the diseased part, with a saw, whose toothed portion was not more than fifteen lines long; when this was done, I detached the fragment thus insulated from the pleura, by using a simple spatula. The seventh rib was laid bare, to the same extent, insulated and detached in the same manner, but with greater difficulty, and not without slight laceration. The pleura then appeared evidently diseased, thickened and fungous. Not to have excised it, would have been to leave the operation incomplete, which had lasted twenty minutes. Each of the assistants were prepared to arrest the dangerous hemorrhage which was to be feared, at the moment when the intercostal arteries were cut. I cut out the portion of the pleura with scissors, curved edgewise, and whether the section produced by this instrument, which cuts less by sawing than by pressing, and bruises the textures it divides, produced the retraction of the vessels, or whether their calibers had been divided, in consequence of the antecedent cauterising, not a drop of blood flowed. But at this moment, the external air rushed into the chest with violence, and compressing the left lung, which with the heart, enveloped in the pericardium, was carried towards the opening. I attempted, by applying my hand, to moderate the entry of the air, and prevent suffocation, which ap-

peared imminent, while with the right hand, I applied over the wound, a large cloth, spread with cerate. The entrance of the air was suddenly suspended by this greased cloth, which not only covered the wound, but all the corresponding side of the chest. Over this, I placed a large thick pledget of lint, covered it with some pieces of linen, and kept on the whole dressing by a roller bandage, moderately tightened." The patient went into the country, on the twenty-seventh day after the operation.



# APPENDIX,

CONTAINING

## SOME OF THE LESS IMPORTANT SURGICAL OPERATIONS.

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### *Extraction of Teeth.*

1st. *Extraction of incision and canine Teeth with the forceps.* The patient being seated on a solid chair, with a raised back, slightly curved outwards, the operator holding a straight forcep in his right hand, seizes the tooth he wishes to extract, on a level with its neck, without injuring the gum. He should not press too hard for fear of breaking the tooth. He then rotates his hand slightly from right to left, to loosen the tooth, and withdraws it perpendicularly, to finish the extraction.

2d. *Extraction of the large and small grinders with Garenggeot's key, or the pullikins.* The patient is placed as above directed, the operator, placed in front of him, holds the instrument between the middle and index finger of the right hand, so that the handle of the instrument shall be totally seized with the palm of the hand. He introduces the key into the patient's mouth, and applies the extremity of the fang, which should be proportioned to the size of the tooth, on its internal surface, near the gum, and the fulcrum covered with a piece of linen or leather, on the outside of the gum, opposite the

extremity of the root of the tooth. If it be an upper tooth, the operator keeps the fang in place, with the thumb of the left hand; should it be a lower tooth, he fixes the fang with the fore finger of that hand. He then gives the key a half turn from within outwards, and finishes by extracting the tooth in a perpendicular direction. If the tooth be only loosened, the extraction is completed, by using straight or curved forceps. When the last molars are to be extracted, it will be better to have the fulcrum on the inside, and turn the tooth from without inwards. When there are adhesions, they should be destroyed with a cutting instrument.

The mode of holding the key varies according to the teeth to be extracted. Thus we supinate the hand in extracting the lower molars, on the right side of the jaw, and pronate it, when removing one on the left side. To extract an upper tooth on the right side, we move the hand in the same manner as for the lower teeth of the left side, and *vice versa* on the opposite side.

When the grinders are loose, and their roots appear neither very large nor divergent, we extract them with curved forceps. For this purpose, we lay hold of the tooth, bearing with the thumb or fore finger of the left hand, on the back of the jaws of the forceps; we carefully loosen the tooth, and finish by extracting it perpendicularly. To operate on the left side, we should stand in front of the patient—to operate on the right side, stand on that side. This instrument has the triple advantage of being less painful, not breaking the alveoles, nor wounding the gums.

3d. *Extraction of the roots of the Teeth.* According to their length and degree of adhesion, we extract them with a key, whose fang is sharper than that used when the tooth is entire. We use the grooved punch to raise the root, and then extract it with the pullikins, or with straight or crooked forceps, as the case may require. In



some cases, we are obliged to cut through the gums, to expose the roots of the teeth, and sometimes to remove the external surface of the alveole.

When there is much hemorrhage, we check it, by plugging with lint or agaric, soaked in some astringent fluid; or better still, with a ball of softened wax, or even with the actual cautery, should other means fail.

As dentists are generally consulted for other operations, such as filing, plugging, setting artificial teeth, &c. and moreover, as what we could say on the subject would be necessarily too concise, we must refer to books, professedly on dentistry, for farther information on the subject.

### *Removal of the Nails, &c.*

Different methods have been proposed to remedy the affection, known as the *nail growing into the flesh*. We shall present the modes most commonly employed.

*Dupuytren's method.* The patient being seated on a chair or upon the edge of a bed, the surgeon, sits in front of him, and takes the patient's foot upon his knee; he then takes a pair of straight strong scissors, introduces the pointed blade underneath the nail, and passes it rapidly, from the outer edge to the middle of the base of the nail, dividing it from before backwards, in two equal parts. Then taking hold, with the dissecting forceps, of the interior edge of the diseased portion, he raises it, turns it over, and pulls it entirely away, after having destroyed its adhesions: he then applies the actual cautery, at a white heat, to consume the fungous flesh, which surrounds the ulcer, when the quantity is great.

*Another mode of removing the Nails.* When we wish to remove the whole nail, it may be done in two ways; by raising it all at once, or by dividing it into two equal parts, which are to be successively removed. Which-

ever method be preferred, an incision should be made behind the root of the nail, to destroy its matrix, which without this precaution, may give origin to a new nail, after the first has fallen off. To make this incision, we lay hold of the extremity of the great, or another toe, between the thumb and fore finger of the left hand: holding a bistoury in the third position with the right, we make a semi-lunar incision with a posterior convexity, upon the dorsal surface of the great toe, about a line behind the loose edge of the skin covering the base of the nail. We then take hold of this by its anterior edge, with dissecting forceps, and turn it over on its base. If we prefer to divide the nail into two equal parts, after DUPUYTREN's mode, we remove the two pieces successively, after having acted as in the first instance.

*Ambrose Parés' method, commonly attributed to more modern practitioners.* This consists in cutting off, on the level of the nail, the soft parts which cover it, by thrusting a straight bistoury through, near their base, and cutting from before backwards, we turn the blade to the opposite side, and finish by cutting off the flap. We then use the actual cautery. This method has been often successful in the hands of MESSRS. BRACHET and LISFRANC.

*Mr. Faye's method.* This consists in thinning as much as possible, the back of the nail, in the direction of its length, by scraping it with the edge of a keen instrument. We then make with the scissors a V shaped incision, to remove a part of the free edge of the nail; in the middle, if the disease exist on both sides, and nearest the diseased side, if but on one. When this is done, we pierce the nail on each side of the incision, near its anterior extremity, and pass through each of the small holes, a small wire, the two ends of which are united, to twist them together, in order to approxi-

mate the two edges of the incision, and by this, to withdraw the side of the nail growing into the flesh. The twisting is daily increased a little, and the desired effect is gradually obtained. Mr. FAYE, a naval surgeon, employs this method with great success; when it is practicable, it has the additional advantage of saving the patient from the horrible pain, inseparable from tearing off the nail.\*

At the same time that we employ this method, we may apply a small bandage, whose first turn passes over the free edge of the nail, and with which we make several light turns around the end of the toe, to compress the soft parts which raise up at the side of the nail, after having placed over the projecting portions, small rolls of lint. When the disease is not very far advanced, and is on the outside, it often suffices, to cure the affection, if the toe be kept apart by a small roll of lint, or a piece of linen folded up several times, which may be secured by some turns of a bandage passed around the great toe.

*Desault's mode.* This consists in passing under the nail, a thin plate of tin, or rather of lead, as Professor RICHERAND advises, and to bend it lengthwise towards the lower part of the toe, to depress the soft parts

\* In all cases, the "horrible pain" of dragging off the nail may be avoided, by the following method, which I have used with the most satisfactory results. With a very keen knife, cut perpendicularly through the middle of the whole length of the nail, by removing small shavings at each stroke. When the nail is entirely divided in the middle, take a very narrow bladed knife (such as the iris knife of the ocular case) and gradually cut under the segment of the nail, so as to detach it from the soft parts, letting the edge of the knife always be directed upwards, or towards the nail. In this way, by a little patience, the whole nail may be removed, if necessary, without giving the patient very perceptible pain.—J. D. G.

placed below it. A small bandage serves to keep it in place, and the dressing is renewed every two or three days. This method has fallen into disuse.

*Extraction of the Eyelashes, and operation for Trichiasis.*

In the affection called trichiasis, the eyelashes growing towards the globe of the eye, irritate it, and may produce a dangerous ophthalmia. The indication is to remove such eyelashes with a pair of tweezers. But they will soon sprout out again, if the bulb be not destroyed at the same time: this may be done by means of the cautery. To do this, we employ a cautery made for the purpose, terminating in a blunt point, but having at five or six lines from the point, an orbicular enlargement, about as large as a hazle nut. This little ball, which is heated at the same time as the point is destined to keep up the necessary quantity of heat, to effect the cauterization; hitherto, this was the greatest difficulty. The cautery being properly heated, the surgeon, taking its handle in the right hand, with his left separates the lid from the globe of the eye, by pinching up its loose edge, and applying the heated point to the holes left by the hairs pulled out.

*Of Bloodletting.*

However simple this operation may appear, it is sometimes accompanied by formidable accidents, which may result from the inexperience of the operator, or circumstances peculiar to the state of the patient.

We draw blood from the veins or the arteries, but most frequently from the veins.

The veins most commonly opened, are those of the arm or foot; of the neck and tongue, as for the arteries, none but the temporal is chosen.

To perform this operation, we require, if the chamber be obscure, a candle, a ligature of ribbon or flannel, two compresses, a smaller and a larger one, a roller bandage, and a bowl to receive the blood; also some warm water, cold water, and Cologne water or vinegar, or a bottle of hartshorn, in case the patient faints—a fine lancet—a small pair of dissecting forceps, to lay hold of the fat, which may be pressed over the opening in the vein, or a probe to push it out of the way.\*

*Bloodletting from the Arm.* Mr. LISFRANC has published an excellent memoir on bleeding from the arm, by which we shall profit on the present occasion.

The upper part of the median cephalic vein is the most advantageous point for the performance of bloodletting. To effect this, the arm should be in a state of semi-flexion, and slightly pronated, to cover the musculo-cataneous nerve and the tendon of the biceps, and

\* In many cases, we fear that the lives of patients would be in danger, were we to wait until this paraphernalia should be arranged. To perform the operation efficiently and safely, the only *instruments* necessary, are a good lancet and a ligature of any material, to compress the arm above the elbow, and make the vein swell, and a vessel of some sort, to receive the blood. To avoid any obstruction from the fat, let the incision through the textures, superjacent to the vein, be made freely, and the arm be kept in the position it was in, when the cut was first made. After the bleeding is ended, and the compress removed from the arm, two slips of court plaster (made with fish glue) placed so as to cross the cut at right angles, will keep the edges in contact with more certainty and advantage than the common compress and figure of 8 bandage, round the arm. When the patient faints, the recumbent posture, and sprinkling the face with cold water, will, under ordinary circumstances, soon revive him.—J. D. G.

the opening be made in the vein above the middle part of the insertion of the tendon of this muscle. By following this method, we may always avoid wounding the nerve or tendon. When we cannot open the median cephalic, we next prefer; 1st. its continuation; 2d. the superficial radial; and 3d. the median basilic.

When the latter vein runs along the muscular interstice, formed by the long supinator and round pronator, it has always over it some nervous filaments, which it becomes almost impossible to avoid cutting. In thin subjects, the radial artery, situated immediately under the antibrachial fascia may be wounded; in such cases, we avoid the last two named veins.

If we cannot bleed, except from the ulnar or median basilic veins, the latter should be preferred, because all the ulnar veins are accompanied by so large a number of nervous filaments, coming from the median nerve, that it is almost impossible to avoid them. The median basilic vein ought to be opened on the outside of the artery, and never immediately over the point where the latter is crossed by the vein, as is done by the greatest number of bleeders, because the vein projects most at that place. With these precautions, the following is the mode of performing the operation.

The patient being seated, or most commonly reclining on the edge of his bed, presents to the surgeon, the arm to be operated on. The surgeon places his ligature, with which he makes several turns around the arm, at about an inch and a half above the point where he wishes to open the vein; he secures this ligature by a bow knot, in order to be able to loosen or tighten it at pleasure. He keeps it on for a length of time, varying according to circumstances, even for half an hour, or an hour, if necessary, and causes the patient to contract the muscles of his fore-arm frequently. By taking these precautions, he will less seldom fail in drawing blood



from the arm, than commonly happens, when it is difficult to perceive the presence of the vessels. Should this be unsuccessful, in causing the veins to swell, we place the limb in warm water, for a short time; otherwise the cellular tissue swells, the skin reddens, and the vessels are much more concealed than before.

The surgeon then opens his lancet at right angles, with the handle, the end of which he puts into his mouth, having the heel towards the hand with which he is to use it. The patient's arm remains extended over one of the surgeon's hands, while with the other, he seeks by slight friction, from below upwards, to bring the blood from the extremities, towards the nervous trunks. When the vessel is sufficiently visible, the surgeon steadies it with his left thumb; seizing then the heel of the lancet between the thumb, fore and middle finger of the right hand; if he be about to bleed from the left arm, the ring and little fingers being destined to serve as a point of support, he flexes the fingers, holding the lancet, whose point he presents towards the vessels, and by a slow and moderate extension of the same fingers, he penetrates the vein, and raises up the point of the instrument, which enlarges the incision. The direction of the incision is commonly oblique.

If the operator make a first cut without opening the vein, he examines whether the wound corresponds with the situation of the vein he wishes to open: in this case, he introduces his instrument into the wound, to open the vessel more deeply, quieting the patient by saying something prevents the blood from flowing.\* Should

\* In the original, the surgeon is advised to tranquillize the patient, by saying he is going to remove a piece of fat which prevents the flow of blood. He who can utter an untruth as a matter of *convenience*, is not fit to be trusted even with a lancet.—J. D. G.

the wound not correspond to the vein, we may draw it aside, so as to bring the wound over the vein, and then proceed as above stated. When the fat closes the orifice, and prevents the flowing of blood, it should be pressed aside with the forceps or a probe. Should the ligature be too tight and compress the artery too much, the blood cannot even reach the veins: in this case, we relax the ligature a little. We tighten it on the contrary, when the bleeding is stopped, because the superficial veins are not sufficiently compressed.

When enough blood has flowed, the surgeon loosens the ligature, places the left thumb over the opening, and cleanses the arm with a rag dipped in warm water. A small square compress is applied over the wound, then a larger one, and the whole is kept on by a bandage passed round the arm, which forms a figure of 8.

It may happen when the arm is thick and round, that we cannot discover a vein even on the hand. It may, nevertheless, be requisite that blood be forthwith drawn. In this case, Mr. LISFRANC proposes to open the cephalic vein at the intermuscular space of the deltoid and great pectoral, near the point of their junction; there this vein is most constantly found without anomaly. We make an incision along this interstice about an inch long, parallel to the axis of the humerus, with a convex bistoury, and after having divided the skin and cellular texture, the vessel is exposed, and opened with a lancet.

*Bloodletting from the hand.*—After applying the ligature as heretofore directed, an inch or two above the point where we wish to open the vein, we dip the hand for some minutes into tepid water to render the veins apparent. The cephalic vein of the thumb is commonly the one which is of the largest size, which is to be opened according to the directions heretofore given.

*Bloodletting from the foot.*—This is performed from

the internal or external saphena vein, but almost constantly from the former. We first apply a ligature a little above the ankle, place the foot in warm water, and then open the vein. The foot should be kept in the water while the blood is flowing; when we perceive by the discolouration of the water that enough blood has flowed, we remove the ligature, and apply first a small and then a large compress over the wound, sustaining the whole by aid of a roller bandage.

*Bloodletting from the external jugular.*—To render the jugular vein apparent, we apply a graduated compress on the inferior part of the trunk below the point where the opening is to be made; we place over this compress the middle of a bandage, whose extremities are given to an assistant, who tightens them to the necessary degree, or else they are carried under the arm pit of the opposite side. The surgeon being seated, or standing alongside of the patient, and holding the lancet as has been pointed out, opens the vein above the point of compression, by giving the incision a direction perpendicular to the fibres of the platysma myoides. The blood is received in a cup, which is pressed against the neck to prevent the blood from flowing over the body. The bloodletting being finished, we remove the ligature, and place over the wound a small, and then a large compress, which is kept on by a moderately tight roller, passed alternately under the arm pit, and round the neck.\*

*Bloodletting from the lingual veins.*—This is performed from the raninal veins. The patient, seated facing a window, opens the mouth, and raises the tongue, the point of which should touch the roof of the mouth. If we fear that he may lower it, we may retain it by

\* Slips of strong court plaster, extending to some distance on each side of the wound, and crossing each other at right angles, would be preferable.—J. D. G.

pressing it with the handle of a director, after placing a piece of cork between the teeth at the angles of the jaw. We then open the vein with very sharp-pointed scissors, or better still, with a lancet. The patient spits out the blood as fast as it flows; it almost uniformly ceases to flow spontaneously, when the head is raised and the breathing is free. Should it not stop, we apply a compress of lint.

*Opening the temporal artery.*—The surgeon takes a straight bistoury in his right hand, places the extremity of his fore finger over the course of the artery, to mark with precision the place where he purposes to cut, and then introduces the point of the bistoury alongside of the artery, and lowers his hand horizontally to cut the vessel across. When a sufficient quantity of blood is discharged, he compresses the artery, by placing his finger over it, between the heart and the wound. After washing the blood off, he substitutes a graduated compress, which should not be applied over the wound. He then applies a second compress on the other side of the sound, because the blood may escape from that side, owing to the anastomosis of the arteries. A larger compress is applied over both the others, and the whole is retained by a moderately tight bandage. In case this is not sufficient, a harder compress and a tighter bandage should be used.

Bloodletting being so frequently performed, we may here speak of an accident which is often produced by it; this is phlebitis, or inflammation of the vein. It is enough to say, that this operation sometimes produces the death of the patient, in order to keep the operator on his guard. The most certain mode of preventing it from becoming dangerous, is positively to forbid the patient from using the arm for the first twenty-four hours succeeding the bleeding.

*Application of Leeches.*

The most simple and expeditious mode of applying leeches is the following: We place in a fine cloth the number of leeches we propose to employ, and we gather them into a sort of lump by rolling them in the linen. This mass is placed over the part we desire to have the blood drawn from, under a tumbler intended to prevent the leeches from crawling off. We then pull by the edges of the cloth to place the leeches on the skin; by this means they cannot attach themselves to the sides of the glass, and if they be well-chosen and disposed to bite, they can only do so on the skin.

When the leeches have fallen off, we keep up the flow of blood by washing the bites with warm water. Should they not let go spontaneously, it is sufficient to sprinkle them with a little salt, vinegar, &c. to prevent the flow of blood, it is commonly enough to apply over them a dry and rather tight compress. When this does not succeed, we have recourse to cold lotions and astringents, or the application of a morsel of agaric over the wounds. Should the bleeding continue notwithstanding these applications, we cauterise the bites with the nitrate of silver, the sulphate of copper, or even the actual cautery. It has been proposed to employ the following method, which never fails: It consists in placing over the opening a piece of linen doubled several times, over this we apply the extremity of a spatula or other conveniently shaped piece of iron, heated so as not to cause burning. The heat evaporates the more fluid parts of the blood, and the remainder forms a coagulum which prevents the continuance of the hemorrhage.



*Cupping.*

After having exposed the part which it is proposed to cup, and shaved, if it be covered with hair, we foment it with a sponge, or a piece of rag soaked in warm water. Alongside the surgeon are arranged several cups, towels, a lancet, a bistoury, or a scarificator, several little balls of cotton as large as a hazlenut, a lamp, or a lighted candle, a pair of forceps, and a vial of alcohol. Every thing being ready, the surgeon holds a cup in his right hand; with the left he takes one of the little balls of cotton, in the forceps, dips it in alcohol, and sets it on fire by the lamp, he then drops it into the cup. The air is soon rarefied and driven out of this instrument, which is then applied with quickness and exactness over the skin, where prepared for the purpose, so as to prevent the access of the atmospheric air. The cotton ceases to burn almost instantaneously; the rarefied air condenses; a vacuum is formed; the pressure of the atmosphere drives the blood into the cutaneous tissue, which raises up within the cup, which remains strongly applied without the aid of the hand. We may also make the vacuum by holding the mouth of the cup over the blaze of a spirit lamp. The surgeon repeats the same manœuvre in relation to the other cups; he may even repeat the operation on the same spot until he judges the rubefaction sufficient. He then removes the cup, unless it fall of itself; then applying the scarificator over the turgid part; he lets go the spring, and cuts the little incisions through the skin, and over these the cup is applied, and in the same way as many as are desired, may be applied.

If we have no scarificator, we use the common bistoury, or a lancet simply. To do this, we make slightly, several longitudinal and parallel incisions, a quarter or half a line deep; while the right hand directs the lancet,



we tighten the skin in the opposite direction, with the left thumb and fore finger. We may, if it be preferred, make punctures through the skin, perpendicularly with the point of the lancet; these should not be more than a line deep.

Instead of balls of cotton dipped in alcohol, we may on occasion, use dry cotton or lint. But this is too readily extinguished, and being more tedious and inconvenient, we never use it where it can be avoided.

When enough blood has been drawn, we wipe the parts with a rag or sponge, soaked in warm water; we then cover the little wounds with a piece of diachylon plaster, to prevent suppuration. Some practitioners are in the habit of pouring oil on the scarified skin, covering it with a bandage of fine linen, and retaining it by a roller.

*Dry Cupping.* The operation is precisely the same with that described, except that after producing the rubefaction, we do not scarify the skin. After removing the cups, we apply a hot towel on the reddened parts, and cover up the patient.\*

\* The next article in the original, relates to the use of SARLANDIERE'S *Bdellometre*, which is not used at all in this country, neither does it deserve to be, since we have a vastly superior contrivance in

#### SELLERS'S CUPPING INSTRUMENTS.

The cups of the ordinary shape have a small brass nut, with a hole through the centre, projecting from the bottom of the cup. This hole is closed by a very simple, lasting, and easily replaced valve. A small syringe or exhausting pump, having an extremity corresponding in figure to the bottom of the cup, and having this extremity covered by a soft piece of buckskin, which is retained by a screw. When we wish to apply any number of cups with this apparatus, it is only necessary to have the end of the brass syringe dipped in warm water, and after making the scarifications in the ordinary way, to apply

### *Plugging the Nostrils.*

When epistaxis cannot be otherwise arrested, we have recourse to plugging the nostrils.

We introduce BELLOCQ's director, containing its spring stylet along the floor of the nostrils, till its extremity passes beyond the palate: the spring is then pressed, and the button projects towards the anterior part of the mouth. To this we attach a doubled thread, in the middle of which a little bundle of lint is tied. The stylet is then drawn within the canula, and the latter withdrawn from the nostrils. We then detach the thread, and fix between the two strands a second mass of lint, which closes the anterior opening of the nostrils exactly, as the first does the posterior. The other nostril may be plugged in the same manner, if necessary.

In case BELLOCQ's instrument be not at hand, we may employ a piece of flexible whalebone, or other flexible substance, introducing it through the nostrils, and bringing forward the thread and lint nearly in the same manner as above directed.

### *Blisters.*

The part being prepared and the plaster ready, the latter is slightly warmed, and applied, pressing it

the bottom of the cups to the end of the syringe, place its mouth against the scarified part, and give one or two pulls, to exhaust the syringe and cup. In this way, as many cups may be applied as desirable, without the least inconvenience. The great advantages of this instrument are, its simplicity, cheapness, and the ease with which it may be used, and kept in repair. It is the invention of Mr. COLMAN SELLERS, a very ingenious mechanic of Philadelphia.

lightly with the palm of the hand. When the blister is applied upon the arm, thigh, or leg, after covering it with a soft compress, we retain it by aid of a roller; but when it is applied upon the trunk, or any other part where the roller bandage would be inconvenient or inadequate, we fix the blister, by applying two adhesive straps, which cross at right angles over the middle of the plaster, having their extremities to pass beyond it, and be attached for five or six inches to the adjoining skin.

When the blistering ointment is good, the vesication occurs in about twelve hours, and it would be useless to allow it to remain longer.

We then remove the bandages, detach the plaster carefully; and should any of the ointment adhere to the skin, we wipe it off with a warm wet cloth. We then cut the vesicle at several points, in order to discharge the water, but do not allow the cuticle to be removed, which would expose the sensible surface of the skin, and cause a great deal of pain. By leaving it in place, we scarcely occasion perceptible uneasiness. We then apply a piece of soft old linen, spread with simple cerate, such as beeswax and sweet oil, &c. &c. or with fresh cabbage leaves, wilted or softened, by holding them before the fire, and squeezing them in the hand. The whole blistered surface should be thus covered, and the dressing be retained by a suitable bandage. The dressing, if with cerate, is repeated once a day; if with leaves, according to circumstances, as they sometimes soon grow dry and unpleasant.

When we wish to keep up an irritation for some time, we must not apply the dressing of simple cerate, as the surface will be healed in two or three days, but we apply a salve, containing some of the blistering ointment, at every daily dressing. When we wish to heal the surface, we again substitute the simple cerate, instead of the irritating ointment.

It often happens that the fluid produced by the irritation of the blister flows on the adjoining surfaces, and excoriates them. We obviate this inconvenience, by applying lint around the lower edge of the blistered surface, after having applied a piece of bibulous paper over it; the lint is kept in place, by covering it with a large piece of linen, and a roller, or by means of two adhesive straps, placed parallel to the axis of the body; a third strap crossès the two former on the outside of the compress, and all of them extend for some inches on the adjoining skin.

We never wash a blistered surface, but dry it at each dressing, with a fine linen cloth, frequently applied, slightly pressing it against the surface, holding it tightly at each end.

Small blisters applied behind the ears or other parts, may be kept in place by adhesive straps; if we wish to make them suppurate, we use the blistering ointment repeatedly. Otherwise, we dress them with simple cerate, or rather leave them uncovered or exposed to the air, if not liable to be irritated by the friction of the hair, or the dress of the patient.\*

\* Blisters, when applied on delicate or irritable subjects, sometimes cause a very severe wound, which is sometimes followed by a disposition to gangrene, or by an erysipelatous inflammation, which terminates fatally. In such cases, the most effectual remedy is the application of a decoction of cantharides in spirits of turpentine, which almost immediately affords relief from the intense irritation, and stops the progress of the disease. For the use of this excellent remedy in this state of inflammation, the profession is indebted to JOHN RHEA BARTON, M. D. of Philadelphia. Dr. SAMUEL L. HOWELL, of Woodberry, N. J. has published in (the second volume, new series, of) the Philadelphia Journal, a very interesting account of his experience of the good effects of this prescription.—J. D. G.

*Seton.*

When we have chosen the place for this operation, we take hold of the skin with the left hand, to make a fold perpendicular to the axis of the body or limb. We pass a seton needle carrying a proper quantity of thread through this fold, not forgetting to give it a slightly oblique direction in order to facilitate the flow of pus. Should we not use the seton needle, we may perforate the fold with a straight bistoury, and pass the seton needle through, by introducing it alongside of the point of the bistoury, which is withdrawn after the needle is introduced. It often happens that patients object to having the seton through the skin of the neck, on account of the cicatrix, which it leaves visible. As we frequently have no other means of conquering violent ophthalmia, it is of importance that the above objection should be overcome, and the seton be placed so as to cause no deformity. To effect this, it is only necessary to choose the upper part of the neck, which is covered by the hair. This is shaved where the needle is to be passed through, and we perform the operation as before directed.

If we cannot pinch up the skin into a fold, we do not hesitate to perform the operation. In this case, we pass the needle through the skin, push it along underneath it, to the point where it is to come out, without injuring the subjacent parts.

*Permanent Issues.*

When an issue is established on the thigh or leg, it may be inconvenient; but should the leg be chosen, we place it three or four fingers breadths below the knee, between the internal gastrocnemius, and the tendon of

the sartorius. On the thigh, we choose the depression near the knee on the inside; if on the arm, the space between the biceps and deltoid muscles.

When the place is decided on, the surgeon makes a longitudinal fold with the skin pinched up, and then makes a transverse incision through the integuments. A small tent of lint is kept in the wound for a few days, in order to irritate it. We then place a pea in the wound to prevent the healing, and keep up a continual irritation. To retain the pea or peas in place, it is best to stick them against a strip of adhesive plaster, and then apply them; they will then be sufficiently within the wound.

When the patient objects to the cutting instrument, we employ caustic potash to establish the issue, which, however, is more painful, and less expeditious. We apply a piece of adhesive plaster, having a hole in the middle over the point where the issue is to be established, to receive a morsel of potash of the size of a large pea, and to retain this we place over it another piece of adhesive plaster. A roller bandage is applied over the whole, and in five or six hours the eschar is formed. We then remove the dressing, and make a crucial incision through the eschar, and to facilitate its falling off, we apply an emollient cataplasm. The eschar commonly comes off in four or five days, when we apply the pea, as has been already described.

### *Application of Potash to open an Abscess.*

To open an abscess, profoundly, or even superficially seated, it is directed that a piece of potash, proportioned to the opening to be made, should be applied over the point, as for the purpose of establishing an issue. When the abscess is very deeply seated, we repeat the



potash several times, until the purulent cavity is laid open.

### *Application of the Actual Cautery.*

The actual cautery may take precedence of all others, and is one of the most powerful assistants to surgery. When we have chosen the cauterising iron, which is adapted to the form of the part to which it is to be applied, we heat it in a chafing dish of glowing coals at a short distance from the patient. The degree of heat imparted to the instrument is marked by the colour it acquires, and which varies from gray to white.

The less the cautery is heated, the more pain it causes, and the less it destroys the parts to which it is applied: thus the cautery heated only to a gray heat, is very irritating, and causes acute suffering, while the cautery at a white heat is more active, but much less felt.

The cautery being properly heated, an assistant presents its handle to the surgeon, the latter applies it immediately to the proper point for some seconds. He should always have several cauteries at the same time in the chafing-dish, so that if the first does not produce the desired effect, he may use a second without keeping the patient in suspense.

### *Application of Moxa.*

To prepare moxas, carded cotton is commonly used, which is twisted so as to make a sort of cord, (of a thickness proportioned to the eschar we wish to obtain:) around this we sew a piece of linen very tightly drawn. The latter precaution is unnecessary if the cotton be properly prepared and covered externally by a solution of gum arabic, which in drying keeps the fila-

ments of cotton united. When it is prepared, we set fire to one of the extremities, and place the other on the part to be cauterised. We hold it in this position with the dressing forceps, and we accelerate the combustion by blowing it with a pair of bellows, or with the mouth. We should blow so that the moxa may burn as slowly as possible, without allowing it to be extinguished.

*Cauterizing by the application of an acid Fluid.*

The sulphuric, nitric, and hydro-chloric acids, are those most frequently employed, when we do not wish to use the actual cautery nor potash. To use these acids, we dip in the fluid, a small pledget of lint, fixed on the end of a wooden handle. The hydro-chloric acid is very often employed by Dubois, after the bite of rabid animals. To use this, he excises with a bistoury the bitten part, and touches the wound with the acid, by means of the wooden handle, &c. above mentioned.

*Vaccination.*

After having received on the point of a lancet or a needle, a portion of the vaccine fluid, the surgeon takes hold of the left arm of the patient, by its posterior surface, tightens the skin, and makes with his right hand, a longitudinal or horizontal incision on the anterior surface of the superior part of the arm, and of such a depth as that the point of the instrument is scarcely coloured with blood. He then passes the extremity of the lancet flatwise, over the point where he has broken the skin, to deposit there a part of the vaccine fluid, which is still adherent. The same operation is done upon the other arm. A common needle, dipped in the vaccine fluid, and with which a simple puncture is made, be-

tween the epidermis and skin, (giving it a slight rotatory motion, to deposit the fluid) may on occasion, serve to effect the vaccination.

The vaccine fluid is fresh or dried: it is fresh when we take it immediately from a patient's arm; dried when it has been preserved between two pieces of glass or in capillary tubes. The scab is also employed for the same purpose. When we wish to use the dried matter, we wet the point of the lancet, and scrape a small portion of the matter, until it is sufficiently fluid to be used. When much water is added, the success of the operation will be very doubtful.

### *Artificial Nipple.*

It is not uncommon to find the nipples of nurses chopped, and so very irritable, that they cannot suckle their infants without dreadful pain. The following mode of obviating this inconvenience is described by LISFRANC, in his lectures, as the invention of another practitioner.

A sort of funnel of wood or ivory is turned nearly of the form of a large cupping glass, except that its orifice is much deeper; at the basis of this, a small rim made on the same piece stands up, which has a small groove about two lines from its extremity. The skin of a young cow's teat is fixed over this, and tied by a string, which presses into the circular groove. The cow's teat may be kept in alcohol for this purpose, during several years; when it is to be used, all smell of the spirit of wine may be dissipated by boiling it in milk.

The instrument being prepared, it is only necessary to apply the orifice in the ivory on the breast, so that the nipple shall correspond to the central opening; the child will soon lay hold of the false nipple, and suck

with nearly as much ease as from the true one, and without pain to the mother.

*Perforation of the lobe of the Ear.*

After pressing the lobe of the ear for some time, to deaden its sensibility, we support it against a piece of cork, and pierce it with a conical needle of gold or platina. When the needle is withdrawn, we introduce a piece of leaden wire, and after a time, the opening becomes permanent.

THE END.

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# SYNOPTIC TABLE,

CONTAINING THE PRINCIPLES OF NATURAL LABOURS,

AND THOSE REQUIRING MANUAL ASSISTANCE.

To understand the principles contained in these two tables, it is necessary to remember the dimensions of the pelvis, and of the head of foetus. Moreover the mechanism of natural labour should be well known, of which the others should only be an imitation.

Dimensions of the female pelvis and foetal head.	Dimensions of the female pelvis.	The pelvis in the superior and inferior strait, and the hollow comprised between them. Axis of the superior strait: a line drawn from the umbilicus, to the inferior extremity of the sacrum. Axis of the inferior strait, a line passing from the sacro-vertebral angle to the centre of the vulva. Length of the four diameters of the superior strait in the living subject: antero-posterior or sacro-pubic four inches: transverse four; the oblique from one acetabulum to the opposite sacro-iliac symphysis four and a half. Length of the four diameters of the inferior strait, each four inches; the antero-posterior may acquire half or three-fourths of an inch, by the motion of the coccyx backwards. Extent of the cavity of the pelvis; from the symphysis pubis to the hollow of the sacrum five inches; this is the greatest diameter.
	Dimensions of the foetal head.	We distinguish five diameters: occipito mental five inches and even five and a quarter; occipito-frontal four and one-fourth: transversely from one parietal protuberance to the other three and one half: perpendicular diameter from the vertex to the base of the cranium three or three and a half.
Head presentations. Four positions.	First, occiput towards the left acetabulum. Second, occiput towards the right acetabulum.	MECHANISM. Flexion of the chin on the breast. The head clears the superior strait. Movement of rotation produced by the inclined planes of the pelvis; the occipital protuberance is carried behind the symphysis pubis, the face toward the hollow of the sacrum. The head arrived at the interior strait; clears it; the occiput is first disengaged as in all head presentations: then the face by passing successively over the whole concavity of the sacrum; the shoulders enter the superior strait diagonally; perform a movement of rotation: the one which is to the back part first escapes from the inferior strait. The same mechanism for the nates.
	Third, the occiput towards the right sacro-iliac junction. Fourth, the occiput towards the left sacro-iliac junction.	The same mechanism, except that after the rotatory movement, the face comes behind the symphysis pubis and the vertex into the concavity of the sacrum; the occiput is first disengaged and the face follows. When the chin first presents and is in front, the delivery may take place; then the face is first disengaged; this position is extremely rare. The head is thrown backwards. Should the chin present and the head be thrown backwards, natural delivery is impossible.
Breech presentations. Four positions of the feet, knees and thighs.	First, the heel or tibia to the left acetabulum. Second,—to the right.	MECHANISM. The thighs enter the superior strait diagonally; movement of rotation; one arrives behind the symphysis pubis; and the other in the concavity of the sacrum: the posterior one is first delivered. The same mechanism for the shoulders. The chin is bent on the breast to clear the superior strait. Movement of rotation; the occiput arrives behind the symphysis pubis, and the face in the cavity of the sacrum. The face is first delivered from the inferior strait, as in all cases of breech presentation, and the occiput last.
	Third,—to the right sacro-iliac. Fourth,—the left sacro-iliac junction.	The same mechanism except that after the movement of rotation the face is carried behind the pubis and the occiput towards the sacrum; the face is also first delivered.
Labours requiring manual assistance.	Presentation of the head or some part of the trunk. Presentation of lower extremities of the feet, knees or nates.	TWO INDICATIONS First, When the labour is without accident, and the head is near the superior strait, but badly situated, to place it in the natural situation. To do this we introduce the hand opposite the side of the pubis, to where the head is placed; press the fingers of this hand on the vertex if possible; bring it into the superior strait, diagonally; then abandon the rest to nature: the lever may be advantageously substituted for the hand. Second, When there is syncope, convulsions, dangerous hemorrhage, want of uterine action; lay hold of the feet and turn the child. Whatever is the position, introduce the hand which corresponds to the side of the child which is backwards: the right, if it be the right side; the left, if it be the left; pass the hand over the lateral parts of the trunk, which are found backwards; lay hold of the feet together, if possible, or separately and bring them out of the vulva. Apply at the same time the other hand over the uterus to incline its fundus toward the opposite side. When we cannot get but one foot at a time, disengage it, in the direction of adduction, pass a fillet round it, to secure it and search again, with the same hand, for the other foot: change the third and fourth positions, to the first and third, if possible, by giving the trunk in proportion as it is disengaged, slight movements of rotation from without inwards; disengage the arm in the direction of adduction by commencing with the one which is behind, first depressing the shoulder; then by passing the hand over the different parts of the face and chest, give the head its movement of flexion, by applying the ends of the fingers of one hand upon the occiput which is raised, and the other upon the sides of the nose, to depress the head; give it the movement of rotation, by placing the fingers of one hand near one of the mastoid processes, and the other upon the opposite side of the chin; support the perineum, deliver the face first, as in natural labour, with a breech presentation. DIAGONAL POSITIONS. Lay hold of the feet with the hand opposite to the side of the pelvis, towards which they are directed, with the right hand if they are to the left; with the left, if they are towards the right; bring them down together, if possible, or separately after securing the one which is brought out; finish the labour as after the turning; change, if possible, the third and fourth position to the first and second sacro-pubic positions; employ either hand as may be most convenient.

# SYNOPTIC TABLE OF INSTRUMENTAL LABOURS.

Presentation of the head at the superior strait. In every case the head should be laid hold of in the direction of its occipital or mento-occipital diameter.

Instrumental labours.

Presentation of the knees. Application of fillets if manual aid be insufficient.

Presentation of the breech or knees. Application of the blunt hook, if manual aid be insufficient.

Disproportion between the size of the foetal head and the pelvis.

Complicated labours requiring the use of cutting instruments.

Or decollation of the foetus.

Extraction of the placenta.

In the direct positions in which the occiput or forehead is found behind the symphysis pubis; the two blades are alternately applied with each of the hands; the left blade or the jointed one with the right hand, and the right blade with the left hand.\* One of the hands is placed in the vagina on the sides of the head to direct the forceps. In the diagonal positions both blades are introduced with the same hand. First apply the blade of the side opposite to the one on which the occiput, forehead or chin is found, when they are directed forwards; if the occipital protuberance, the forehead or chin is in front and to left, the left blade; and vice versa, if one or the other be in front and to the right side.\* The other blade is applied with the same hand; the other hand remains in the vagina to direct the blades upon the sides of the head. This being secured, disengage the occiput first if it be a head presentation; support the perineum: disengage the face first, if it should be a breech presentation: should the head be still in the superior strait, give it some movements of flexion and then of rotation, by moving it in imitation of the natural ones. When the trunk of the body is not freed from the pelvis, and the head is still within the superior strait, the forceps should always be applied on the anterior surface of the foetus; however, if we fear to injure the chest, apply the forceps on the posterior surface, bring the head into the inferior strait by moving it in the direction of flexion and rotation; then disengage the blades of the forceps to pass them upon the anterior surface of the foetus, join them together again, support the perineum, and finish by disengaging the face first.

We apply it always upon the knee which is directed forward with the hand opposite to the side of the pelvis to which this knee corresponds. Carry the forefinger of the hand used into the hollow of the knee to pass the fillet; tighten it at the same time the fore finger of the other hand is carried into the hollow of the knee which is behind; finish the delivery as in the manual labour, with a breech presentation.

It is always applied on whichever of the nates is directed forwards. Place one hand in the vagina to direct the blunt hook first introduced flatwise, then turn it, in order to engage it from without inwards in the fold of the groin; apply the fore finger of the other hand in the fold of the opposite groin, and finish the delivery as in the breech presentation.

First Indication. The infant is dead. Empty the skull. Should a fontanelle present, open it with a bistoury, whose blade is conducted on the fore finger of the left hand: if a solid part of the skull present, pierce it with a perforator; the serum then escapes; if there be none, break down the brain with the instrument, and use injections to wash away the remains. Then apply the forceps. If the forceps cannot be applied, use the crotchet upon the base of the cranium or occiput, taking care not to injure the mother; use methodic force in drawing the head into a favourable position.

Second Indication. The narrowness of the pelvis is less than two inches and a half. The CÆSARIAN OPERATION must be performed. The patient reclines on the bed; cut upon the linea alba with a convex bistoury for the extent of about four inches; terminate the incision with a probe pointed bistoury directed from above downwards to avoid the intestine: cut the womb for the same extent, and in the same direction: extract the child and placenta, wash out the womb, and free the peritoneum of blood and other matters; apply a light bandage.

Third Indication. The narrowness of the pelvis is somewhat more than two inches and a half. Perform SYMPHYSEOTOMY, or section of the symphysis pubis.† The patient lies on her back, as for the operation of lithotomy; shave the pubis; introduce a sound into the bladder and press its neck to one side; draw the skin of the pubis upwards; cut the skin gradually, the cellular texture and interarticular cartilage, separate the thighs with caution to enlarge the pelvis; extract the foetus through the natural passages by aid of the forceps; then apply a proper bandage round the body.

If the foetus has been decollated, and the head alone remain in the womb, it must be brought into a proper position with the hand; seize it then with the forceps, sharp crotchet, and empty the skull if it be of a size disproportioned, and terminate the labour as in other cases.

If the trunk remain within and the shoulders still in the superior strait, we must turn the foetus, as heretofore directed; otherwise bring down the arms and draw by them; to extract the rest of the trunk, apply the blunt hook in the axilla, and draw thereby in the usual manner.

TWO INDICATIONS. First. Merely assist nature; draw by the umbilical cord, first in the direction of the superior strait by making a pulley of the fingers placed near the perineum, roll the placenta upon itself without using force, in order to bring away all the remains. Second. Introduce the hand into the womb, separate the placenta cautiously, if it be slightly adherent, and remove it: should it be strongly adherent to the walls of the womb, it may be dangerous to detach it. Leave it for some time longer.

\* Dr. Columbus.

† The operation here recommended, is attended by no advantage, and many dangers. It has never been performed in this country, and never should be.—J. D. G.





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